NEW MANUFACTURING FIRM FORMATION AND REGIONAL DEVELOPMENT: THE CASE OF SCOTLAND, 1968 - 1977.

MICHAEL CROSS

Submitted for the Degree of
Doctor of Philosophy
University of Edinburgh
July, 1982.

Table of Contents

	Page
Acknowledgements	iv
List of Tables	vi
Declaration	ix
Abstract	x
Chapter One: New Manufacturing Firm Formation and Regional Development: An Introduction	1
1. New Manufacturing Firm Formation and Industrial Geography	2
2. New Manufacturing Firm Formation and Regional Development	6
3. Theoretical and Conceptual Considerations	9
4. Study Organization and its Contents	10
Chapter Two: The Data: Sources and Coverage	12
Introduction	12
1. Scottish Council (Development and Industry)	13
2. The Local Employment Accounts of the Department of Employment	26
3. The Closure and Redundancy Records of the Department of Employment	28
4. Data Sources: A Conclusion	33
Chapter Three: Scotland: The Components of Manufacturing Employment Change	35
Introduction	35
1. Data: Estimations and Areal Units	37
a. Estimations	37
b. Areal Units	39
2. Components of Manufacturing Employment Change	45
a. The National Accounts	45

b. A Comparison of Scotland with some UK Regions 51
c. Regional and Sub-regional Accounts 54
d. Local Accounts 64
3. Summary and Conclusions 75

Chapter Four: Industrial Structure and New Manufacturing Firm Formation in Scotland 77
1. Barriers-to-Entry Hypotheses 80
2. Industrial Characteristics Hypotheses 85
3. Factors of Supply Hypotheses 88
4. Summary and Conclusions 91

Chapter Five: Industrial Structure and the Source of New Firm Founders 92
1. The Data 92
2. Previous Employment of Founders 95
3. Incubator Plant of Founders 96
4. Movement of Founders 101
a. Geographic Movement of Founders 101
b. Sectoral Movement of Founders 104
5. Summary and Conclusions 105

Chapter Six: Local Industrial Structure, New Manufacturing Firms, and the Supply of Founders 107
1. Hypotheses Under Investigation 108
2. Scale of Analysis 110
3. Methods of Analysis 111
4. Variables used in the Analysis 111
a. Independent Variables 111
b. Dependent Variable 113
5. The Analysis and its Findings 114
6. Summary and Conclusions 121

Chapter Seven: Implications and Conclusions 124
1. Introduction 124
2. Regional Development 124
3. Industrial Location Theory 127
4. Research Methodology 129

Bibliography 130

Acknowledgements

This study represents three and a half years of research. However, in research-man-years it probably represents something approaching seven to eight man years, and that does not include the many helping hands that have been involved in some way. During my three year stay at Edinburgh University, and the three previous years at University College, London, there have been many people who have made a lasting impression on my thinking. In London, John Salt, Peter Wood and Gerald Manners sparked-off my initial interest in the subject area of the study, regional development. While in Edinburgh, Lyn Collins proved to be a tolerant and stimulating supervisor. My research in Edinburgh was also much the richer by the challenging and stimulating environment provided by John McCalden and Charlie Piggott. I hope this work goes some way to answering their many searching questions.

The study reported here draws on information provided by a number of public bodies. A special thanks is due here to the Scottish Council (Development and Industry) and the Department of Employment. And while too numerous to mention, all of the District and Regional Councils provided much useful data. Still further information was provided by many hundreds of managing directors, chairmen (and women), and their colleagues of the many firms and plants surveyed. Together they spent many hours with me, and gave me a view of manufacturing industry as it actually operates, and especially why, and how firms are formed and survive.

Finally, I would also like to record my thanks and gratitude to the Social Science Research Council for supporting the research and to the Meiklejohn Prize for Geographical Research for funding one of the postal surveys.

List of Tables

Table		Page
2.1	Distribution of Employment by Major Industrial Sectors: Comparison of Scottish Council data for 1977 with Department of Employment figures for 1976	17
2.2	Comparison of Regional Manufacturing Employment Totals: Annual Census of Employment (1976) and the Scottish Council data (1977)	18
2.3	Manufacturing Units by Employment Size: A Comparison of Scottish Council Data for 1977 with the Business Statistics Figures for 1975	19
2.4	Comparison of the Size Distribution of Plants in each Industrial Order: Business Statistics Office and the Scottish Council	24
3.1	Composition of Manufacturing Employment in Scotland in 1977	46
3.2	Scotland: Components of Manufacturing Employment Change, 1968-77	49
3.3	Sources of New Manufacturing Employment in Scotland, 1968-77	50
3.4	Components of Manufacturing Employment Change: Regional Comparisons	52
3.5	Changes in Manufacturing Employment in Scotland, 1968-76: Regional and Sub-regional Accounts	55
3.6	Components of Manufacturing Employment Change in Scotland, 1968-77: Regional and Sub-regional Accounts	58
3.7	Manufacturing Employment Lost in Glasgow and Edinburgh, 1966-71	59
3.8	Percentage Employment Change at the Local Level in Scotland, 1968-76	66
3.9	Dominant Components of Manufacturing Employment Gain and Loss in Scotland, 1968-77: Local Accounts	69
3.10	Dominant Component Mixes of Manufacturing Employment Change in Scotland, 1968-77: Local Accounts	69

3.11	Dominant Component Mixes of Manufacturing Employment Change: A Categorization by the Age and Size of an Area's Industrial Base	74
4.1	Industry Types of New Manufacturing Firms in Scotland, 1968-77	78
4.2	Average Birth Rates for Surviving New Manufacturing Firms in Scotland, 1968-77	81
4.3	Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Barriers-to-Entry	83
4.4	Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Industrial Characteristics	86
4.5	Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Factors of Supply	89
5.1	First Employment Positions Held by Founders Setting-Up a New Manufacturing Firm in Scotland, 1968-77	95
5.2	Employment Position Held by Founders Immediately Prior to Setting-Up a New Manufacturing Firm in Scotland, 1968-77	96
5.3	Spin-Off Rates Categorised by Size of Manufacturing "Incubator" Plants: A Comparison of Studies	97
5.4	Age of "Incubator" Plants	99
5.5	Status of "Incubator" Plants	100
5.6	Geographic Source of Founders	102
5.7	Sectoral Source of Founders	105
6.1	Correlations Between the Local Industrial Environment and the Number of New Manufacturing Firms	116
6.2	Regression Between Number of New Manufacturing Firms with Selected Independent Variables	120

6.3 Local Factors Influencing the Supply of New Manufacturing Firms 122

Declaration.

This thesis has been composed by the undersigned and is based on his own research.

July, 1982. Michael Cross

New Manufacturing Firm Formation and Regional Development: The Case of Scotland, 1968 - 1977.

Abstract

The main aim of the study is to examine and explain why one region, city, or town has more, or less surviving new manufacturing firms than another. And, if over the period of analysis, 1968 - 1977, the spatial variations noted in the survival of new manufacturing firms can account in part for the differences in regional economic performance (in terms of employment) within Scotland. The structure of the analysis presented here is divided into two parts. The first part is concerned with the derivation of the necessary data and with the measurement of the number of surviving new manufacturing firms. The second part builds on these data and develops an explanation (largely on the supply side) of the spatial variations in the numbers of surviving new manufacturing firms. In developing the explanation survey data drawn from the surviving new manufacturing firms themselves is used in an attempt to extend the analysis and explanation. One of the main conclusions of the study is that, all other things being equal, the supply of new manufacturing firm founders is an important determinant in explaining the spatial variations in the numbers of surviving new manufacturing firms, and that founder 'rich' and 'deficient' labour markets can be identified.

Chapter One

NEW MANUFACTURING FIRM FORMATION AND REGIONAL DEVELOPMENT: AN INTRODUCTION

This thesis is a detailed investigation of the process of new manufacturing firm formation. Despite the large number of recent studies concerned with regional development, inner city decline, industrial dispersal, ownership and control, location theory, etc., all of which implicitly relate to the development of new manufacturing firms, there are still large gaps in our knowledge about some of the processes involved, and why some regions possess more new manufacturing firms than others. The primary aim of this study is to contribute some understanding of the processes involved in the formation of new manufacturing firms.

The purpose of this chapter is to outline why an understanding of new manufacturing firm formation is considered to be important to industrial geography as a whole, to studies concerned with regional development, to studies concerned with inner city decline, to studies concerned with ownership and control, and to general theoretical studies. There are, then, several major issues with which the present study is concerned. First, it is concerned with the formation of new manufacturing firms *per se* and the factors which account for spatial variations in their formation and survival. Second, the study of new manufacturing firms in a region which has received continual assistance prior to their founding is bound, in part, to be an evaluation of that assistance programme either directly, or indirectly. Third,

the study is concerned with the methodological problems of combining two levels of analysis, the micro and macro levels. In the former approach, concern tends to lie with the individual firm and its actual behaviour. The latter approach relies upon the availability of large plant based data sets, for example, containing minimal information on every plant in an area or industry. As an approach it aims at making more general statements than is usually possible with the micro level approach. While these two categories for types of approach are not mutually exclusive, most studies can be broadly allocated to one or other of the two. This study attempts to combine both of these approaches in an assessment of the relative contributions made by new manufacturing plants and firms to employment, and in the analysis of the new manufacturing firm formation process. (see MASSEY, 1977, 29).

1. NEW MANUFACTURING FIRM FORMATION AND INDUSTRIAL GEOGRAPHY.

With the development of large manufacturing plant based data sets for several of the major industrial areas of Great Britain (e.g. Liverpool and Manchester, LLOYD and DICKEN, 1978; Glasgow, FIRN, 1970; and East Midlands, FOTHERGILL and GUDGIN, 1979) an awareness has developed concerning the relative importance of new, surviving manufacturing firms in providing employment. These data to-date though have not been fully utilised in considering the new manufacturing firm formation process as such, but a start has been made in this direction with the comparison of the fortunes of Birmingham and Glasgow in terms of the numbers of new firms and the associated

levels of employment created. (FIRN and SWALES, 1978). Further research has also been undertaken by Fothergill and Gudgin initially at the Centre for Environmental Studies and now of Cambridge University (1978a, 1978b, 1982; GUDGIN et al, 1979) considering inter-regional variations in the contribution made by new manufacturing firms. At the macro level, this line of analysis has been further developed by Ganguly using VAT data (1982a, b, and c). The present study represents an extension to these previous and on-going studies not only in that it adds to the analysis of new manufacturing firms and assesses their relative importance in terms of employment provision, but also combines a large volume of plant based data with detailed "behavioural" type information on individual new firms.

Furthermore, the present state of knowledge of the new manufacturing firm formation process is uncertain, and in some respects is based upon supposition rather than "fact". The notion of "seed-bed" growth, for example, which details the process of how a new manufacturing firm comes into existance has not, until recently been the subject of any rigorous enquiry. (LEONE and STRUYK, 1976; FAGG, 1979). Until this time (mid-1970s), the suppositions of Hill (1953) and Kerr and Spelt (1957, 1958) had been readily accepted. Still further, interest has grown with the study of high technology new manufacturing firms in the United States and the subsequent realisation that some regions within the U.K. might "lack" new manufacturing firms, let alone those operating in the high technology sectors. Thus, the bridge between the measurement of the numbers of new

manufacturing firms and the explanation of these numbers (and their variations across space) has only recently attracted a concerted research effort.

Concurrent with these studies of new manufacturing firms and the employment they provide, there has been an increasing awareness that it is not just the size or number of manufacturing plants in an area and the number of people employed in specific industries which determines a region's industrial structure, but also the organization and ownership of those plants as well. While the growth of a new type of business enterprise during the 1920s ushered in new conceptions of the firm (BERLE and MEANS, 1932; BEED, 1966; MACHLUP, 1967), they were not until recent times connected with regional development. Yet these two factors, the nature of a business enterprise and regional development, do appear to be related. The growth, but not the inexorable growth, of firms into larger and larger concerns has led to marked concentrations of different parts of large firms in different regions of the U.K. e.g. Buswell and Lewis (1970) found that the majority of industrial research establishments were concentrated in the South East of England; Evans (1973) noted a similar distribution for the headquarter facilities of most major companies as have other studies (FIRN, 1975; DICKEN and LLOYD, 1976; SMITH, I., 1978; GODDARD and SMITH, 1978). The question has thus arisen as whether or not the regional variations in the number of surviving new manufacturing firms is in anyway related to the distribution of the various component parts of large, multi-plant companies ?

During the last thirty-five years Scotland has witnessed the build-up of an increasing number of branch and subsidiary plants (SCOTTISH COUNCIL (Development and Industry), 1968; WELCH, 1970; FORSYTH, 1972; HOOD and YOUNG, 1976), and only a limited number of the companies "moving to" Scotland have completely transferred their operations. (HOWARD, 1968). The dispersal of industry to the peripheral, and often previously non-industrial regions is a phenomenon common to most other developed economies (EEC, 1975; SUMMERS et al, 1979; ERICKSON, 1978; LONSDALE and SEYLER, 1979) and would appear to be an important part of the process of industrial change, and is probably not solely a response to regional assistance. These locational changes of manufacturing industry are evident in Scotland not only by the dispersion of manufacturing industry within the U.K. (and elsewhere) to Scotland, but also by the dispersion of manufacturing industry within Scotland away from the major and traditional manufacturing centres e.g. Glasgow. It is into this changing environment that the surviving new manufacturing firms studied have emerged. These changes have brought about new industrial and institutional complexes from which new manufacturing firms will emerge. There may therefore be an interplay - possibly a direct relationship - between these locational and institutional complexes and the formation and survival of new manufacturing firms.

It is equally likely that the other features of industrial change, for example, plant closures and contractions, also have an important role in the new manufacturing firm formation process. For example, while new industrial areas are emerging and

recently established centres continue to grow (at least to the end of the study period), the areas of decline may possess a different ownership and industrial structure than the growing areas, and may therefore encourage the formation of new manufacturing firms in different industrial activities.(FIRN and HUGHES, 1974; FIRN, 1975). But, is this in fact the case ? And, if so, why ?

This study therefore attempts to combine many facets of manufacturing industry at present being researched under a common theme - the formation and survival of new manufacturing firms. The study also indicates some of the possible benefits of combining apparently disparate areas of manufacturing industrial research for deriving an explanation. It is only with reference to the whole of the manufacturing economy that an attempt at a more complete explanation is possible. Of course, the explanation offered is not complete, but it does give some indication of the possibilities of such an approach.

2. NEW MANUFACTURING FIRM FORMATION AND REGIONAL ASSISTANCE.

It is impossible to divorce the analysis of manufacturing industry in the U.K. in any period since the 1930s without acknowledging the existance and possible importance of the various regional assistance policies in force during the period. Many attempts have been made to evaluate the impact of regional assistance upon the depressed regions (MOORE and RHODES, 1973, 1974, 1975, 1976; with TYLER, 1977; MACKAY, 1973, 1974, 1978; ASHCROFT and TAYLOR, 1976, 1979), and while they are not without

their critics (CHISHOLM, 1970, 1976; MASSEY, 1978), they have overall failed to move beyond the most limited aspects of regional policy i.e. employment (gross numbers) and plant movement (see MARQUAND, 1980, 44-5). For example, none of these studies have attempted to assess the effect of "migrant plants" upon the pool of local entrepreneurs and hence the number of surviving new manufacturing firms formed (see THWAITES, 1978). Furthermore, they also tend to ignore the role of, say, technology upon the regional distribution of industry (see BRIGHT, 1957; NELSON et al, 1967; DAVIES, 1979; REES, 1979). They also tend to ignore the changes in the type of organizations involved in manufacturing, and the ability of many new multi-plant companies to product switch and cross-subsidise plants, all of which form important alternative strategies open to the multi-plant company. The already completed studies of the direct impact of regional policies represent only a starting point for such analyses, and there remains much further work to be done in this area.

Another area in which further work is needed is into the indirect effects of regional policies. For example, McDermott (1977a) noted with necessary caution that:

> ... the dominance of external capital and lack of highly differentiated or developed firms in Scotland may be interpreted as the outcome of the increasing inter-regional integration of regional economies attendant upon policies orientated towards the achievement of spatial equilibrium. (ibid., 354)

Thus, the very policies implemented to promote regional equity, which under free-market conditions is unlikely (if not impossible)(see WILLIAMSON, 1965; GILBERT and GOODMAN, 1972; and also FRANK, 1969; TAYLOR, 1970; BERNSTEIN, 1971; GALTUNG, 1971), have possibly imposed an industrial structure not conducive to self-generative growth. In fact, a regional economy is created which is even more dependent upon the impetus of another region. Such a condemnation of regional assistance is unfair because it is more likely that it has encouraged the investment in new industrial plant in Scotland rather than having caused it. However, the basic premise of regional assistance policies rests upon the locational-structural explanation for the poor performance of the problem regions (the problems are due to some innate weakness of the regions themselves) and not to the spatial outcome of the economic system itself. Consequently the bright future described by the Hudson Institute (1974, 99) for Scotland is unlikely to be long lived because of its dependence upon external investment.

The present analysis of the numbers and characteristics of surviving new manufacturing firms in Scotland is therefore an examination of a by-product of both regional assistance policies in force over the study period and the economic system itself. It could be argued that a "single region study" can not by itself increase the understanding of the symptoms of either regional assistance policies, or the economic system. However, by making comparisons with studies undertaken in other regions

a degree of balance is given to the present study. One result of these analyses is to cast yet further doubt on the wisdom of continuing indiscriminant regional assistance policies. (see CAMERON, 1979; HUGHES, 1979).

3. THEORETICAL AND CONCEPTUAL CONSIDERATIONS.

No one study could either attempt, or hope to achieve a unified theory of industrial location. Theoretical developments are generally the result of minor modifications and additions to existing theories rather than as the result of their complete overthrow (KOESTLER, 1959; KUHN, 1970). True to this history of theoretical development, this study modifies and adds mirror refinements to previous theories of new firm formation. However, the study does present some new ideas and information which together help to increase the present understanding of the new manufacturing firm formation process.

In fact a central theme of the study is that all of the changes occurring within manufacturing industry have some influence upon all other aspects of manufacturing industry to a greater or lesser degree. Several of these influences or inter-connections between the changing elements of manufacturing industry (and all other parts of the commercial and business complex) and their characteristics are highlighted. For example, explanation is sought at the spatial scale seen to be most appropriate, and depends upon the nature of the phenomena under

examination. Thus, the investment in new industrial plant by multi-plant firms in Scotland is seen to be a process best set within a U.K., if not a European context. Whereas the actual sites considered for such investments are examined on a local basis. This use of several spatial scales is an implicit methodological feature of this study.

The model of new manufacturing firm formation **developed in the course of this study** relates the emergence of new manufacturing firms to their local environment and the factors that affect and influence the fortunes of that environment. It is structured so as to combine as many of the features of manufacturing industry as possible, and it indicates the gains made by adopting this systems - or holistic - type of approach.

4. STUDY ORGANIZATION AND ITS CONTENTS.

After describing the sources and quality of the data used (Chapter Two), an assessment is made of the employment contribution made by the opening of new plants (Chapter Three). This employment contribution is analysed at various spatial scales and is compared to the findings of studies of other U.K. regions. In Chapter Four a detailed analysis is made of the characteristics of new manufacturing firms. Several hypotheses concerning the number of new manufacturing firms in each industry are formulated and examined. By using the evidence presented in the previous chapter and the findings of previous studies, the descriptive aspatial model of new manufacturing

firm formation is further developed in Chapter Five. Chapter Five then examines several aspects of new manufacturing firm founders and further develops the model of new manufacturing firm formation (on the supply side). The final analytical chapter extends the analysis of the individual new manufacturing firm and of the aspatial analyses of the new manufacturing firm founder in an attempt to develop a spatial model of new manufacturing firm formation. In this model the functional form of the relationships between new manufacturing firm formation and the local environment is thought to be the most important output. However, due to the vagaries of the available data a full articulation of the model is not feasible in the present study. Finally, the implications of this study for both theory and research methodology are detailed in Chapter Seven.

Chapter Two

THE DATA: SOURCES AND COVERAGE

INTRODUCTION

The assessment of any phenomenon relies on the existence and availability of a suitable body of information. Often no such body of information exists and so remedies must be sought to obtain the necessary information. This study combines several bodies of information to assess the relative importance of new manufacturing plants, and more especially new manufacturing firms in providing new employment opportunities in (largely) manufacturing industry in the first instance. While no assessment can be made at present as to the accuracy of the identified number of surviving new manufacturing plants, the overall representativeness of the sources from which they were drawn can be assessed. An evaluation of the data bank of the Scottish Council (Development and Industry), then, can be made, and furthermore it is important to establish the coverage available on some of the variables contained in that data set. Two variables of key interest to this study are the year of opening of a plant and the level of administrative employment in an area or in an industry, and both of these variables are considered below in terms of their representativeness.

Two other main data sources are also used, the Department of Employment's local employment accounts (ERIIs and ACE) and their closure and redundancy records. Neither of these sources can be evaluated fully in terms of their accuracy and coverage, but the potential pitfalls in their usage can be highlighted to

indicate their limitations. It is these three sources of data which form the major data inputs into the study and which are discussed in turn below. Comment is also made in the case of the Scottish Council (Development and Industry) data as to how its coverage was improved.

1. SCOTTISH COUNCIL (DEVELOPMENT AND INDUSTRY)

Before any data source can be evaluated it is important to note the use to which the data is to be put. More explicitly, then, what is the "problem" under examination ? For the purposes of this study it must be possible to identify new manufacturing plants, and latterly new manufacturing firms which have opened during the 1968 - 1977 period, and survived until 1977. To achieve these aims it must be possible to distinguish between manufacturing plants in terms of their year of opening and their ownership status. The data bank of the Scottish Council allows manufacturing plants to be identified on this basis. However, it should be added that after the 1974 national manufacturers survey the question asking for the year of opening was removed from the questionnaire. This problem was solved by hand-printing this question on all questionnaires sent out during 1977 (approximately 10,000 in all).

The data bank of the Scottish Council represents a source of company information for use by the Council's employees in their promotion of Scotland and its industries throughout the U.K. and elsewhere. It is not therefore a data source specifically designed for statistical analyses. However, it represents the

one major data source to which access is still possible and which holds a relatively wide range of variables for a large number of manufacturing plants. Despite these initial advantages, the Scottish Council's data bank had, and still has, several weaknesses. Foremost amongst these weaknesses is its imperfect coverage for the smaller manufacturing plant. The term manufacturing as regards the Scottish Council data bank denotes that at least 51 per cent of turnover is derived from a manufacturing activity as defined by the Standard Industrial Classification. It therefore excludes many plants and firms classified as manufacturing by the Department of Employment and Department of Industry. However, with this in mind, an exhaustive attempt was made to remedy this deficiency, and this is briefly outlined below.

At the national level (i.e. Scotland), and for each industry, the weaknesses of the Scottish Council's data bank do not represent major problems. If the data are disaggregated by spatial units other than at the national level (local office area, district, or region levels) or by industrial order level at the local level then deficiencies do emerge. To reduce the size of these deficiencies and the biases they may introduce into any analysis an extension of the existing data bank was necessary. Those plants not already included in the data bank were identified by contacting all of the District and Regional Councils who were asked to supply the names and addresses of all manufacturing plants known to them in their areas. The lists supplied by these bodies had usually been compiled using

the Annual Census of Employment (ACE) records augmented by ad hoc surveys of local industry, or by using the ratings records. In most cases these bodies were able to supply the information sought (77 per cent of cases). In all 3,250 manufacturing plants were contacted during this extension excercise, and of this total 1,602 had been previously contacted by the Scottish Council during similar exercises. This survey added a further 880 plants to the data bank, and extended the plant level coverage by a little over 26 per cent. While these additions made a sizeable contribution to the number of plants covered, they did not add significantly to the volume of employment covered. This is because most of the plants added were in the smaller size categories and usually employed 50 or less employees, and almost certainly less than 100. It should be added that many of the plants from which replies were received had to be excluded as they did not fulfil the criterion of being predominantly a manufacturing concern i.e. 51 or more per cent of their turnover being derived from manufacturing operations.

The resultant data bank was found to contain a large number of plants for which their year of opening was not known. This was the case for a number of the larger plants and, thus, the volume of employment covered by this variable, year of opening, was relatively low. Two related surveys were conducted to remedy this situation. The first covered all companies operating two or more plants in Scotland, and a second covered all plants employing 500 or more employees if not already covered by the first survey. This added a further 225 'year of opening dates' to the data bank, and improved the level of employment coverage on that variable.

A few other additions were made to the data bank from the Annual Census of Employment records and the closures and redundancy records of the Department of Employment. It was from this plant based data set that both new manufacturing firms and plants were extracted. Several features of this data set have a special importance to this study, and they are employment coverage at the local and industrial order levels, the coverage given by the year of opening, the employment type (administrative-operative-other) of a plant, and the size distribution of manufacturing plants in each industrial order. Each of these facets of the data set are compared to official sources of data where possible in an evaluation of the suitability of these data for this study.

At the industrial order level there is a high degree of similarity (see Table 2.1) though these two data sets are not for the same year. The Scottish Council data mainly relate to 1977 (65 per cent of cases), but they also includes employment data from previous years. While the relative importance of each industrial order is similar in both data sets, the largest discrepencies occur in orders 10 (shipbuilding) and 16 (bricks and cement) and largely arises from two major causes. First, by allocating of some types of rig construction to one rather than another order (this involves orders 7, 10 and 16). Second, the naval dockyards of Rosyth and the torpedo works of Faslane are not included and cause a shortfall of 6-7,000 employees in Orders 10 and 12 respectively. For reasons of national security these plants do not normally reply to "non-government" sponsored surveys such as the ones conducted by the Scottish Council.

Table 2.1

Distribution of Employment by Major Industrial Sectors: Comparison of Scottish Council data for 1977 with Department of Employment figures for 1976.

SIC	Scottish Council No.	(%)	Department of Employment No.	(%)
3	74,051	13.2	90,800	14.9
4	2,153	0.4	2,800	0.5
5	24,366	4.3	28,600	4.7
6	34,875	6.2	39,100	6.4
7	83,589	14.9	91,700	15.1
8	19,024	3.4	16,200	2.7
9	46,619	8.3	48,600	7.9
10	33,053	5.9	42,300	6.9
11	33,406	5.9	32,200	5.3
12	24,362	4.3	27,200	4.5
13	57,930	10.3	57,200	9.4
14	1,690	0.3	2,500	0.4
15	27,801	4.9	30,900	5.1
16	24,635	4.4	17,400	2.9
17	14,768	2.6	20,300	3.3
18	41,856	7.5	44,400	7.3
19	17,008	3.0	15,600	2.6
Totals	561,198		607,800	

Sources: Scottish Council (Development and Industry)
Department of Employment

Similarly, at the regional level (Table 2.2) and for the size distribution of manufacturing plants for all industries (Table 2.3) there is a fairly high degree of agreement between the two data sets. It is evident from Table 2.3 detailing the comparison of the size distribution of plants that there is a short fall in the number of plants with less than 99 employees. This deficiency, while expected, is less than would have been

Table 2.2

Comparison of Regional Manufacturing Employment Totals: Annual Census of Employment (1976) and the Scottish Council data (1977)

Region	Annual Census of Employment No.	(%)	Scottish Council No.	(%)	Difference (%)
Borders	13,300[a]	2.2	13,200	2.4	+0.2
Central	36,100	5.9	33,000	5.9	-0.1
South West	11,400	1.9	9,900	1.8	-0.1
Fife	40,300	6.6	33,700[b]	6.0	-0.6
Grampian	37,500	6.2	36,900	6.6	+0.4
Highland	14,700	2.4	15,700	2.8	+0.4
Lothian	66,800	10.9	64,100	11.4	+0.4
Strathclyde	342,000	56.3	307,700	54.8	-1.4
Tayside	45,800	7.5	47,100	8.4	+0.9
Totals	608,000		561,300		

Source: Scottish Council (Development and Industry)
Department of Employment

[a] All figures are rounded to the nearest hundred becuase ACE figures are presented thus by the Department of Employment.
[b] Nearly the whole of the difference between the ACE and Scottish Council totals for Fife can be accounted for by the failure to include the Rosyth dockyards in the latter total.

the case if the extension and additions had not been made to the data bank. Undoubtedly, the data bank does have its deficiencies, but it is largely representative at the national level - Scotland. More important to this study, however, is its representativeness at the local level in terms of employment coverage and industrial structure. Comparisons made between the Annual Census of Employment (ACE) and the Scottish Council industrial order totals for each local office area reveal some of the deficiencies of the data.

Table 2.3

Manufacturing Units by Employment Size:
A Comparison of Scottish Council Data for 1977
with the Business Statistics Figures for 1975.

Scottish Council

Employment Size-Group	Plants No.	(%)	Employment No.	(%)	Mean Size
11 - 19	505	16.4	7,551	1.4	14.9
20 - 99	1,572	50.9	72,961	13.1	46.4
100 - 199	423	13.7	57,969	10.4	137.0
200 - 499	352	11.4	109,133	19.6	310.0
500 or more	232	2.5	309,575	55.5	1,334.4
Totals	3,084		557,189		180.7

Source: Scottish Council (Development and Industry)

Business Statistics Office

Employment Size-Group	Plants No.	(%)	Employment No.	(%)	Mean Size
11 - 19	1,426	29.6	20,437	3.4	14.3
20 - 99	2,276	47.2	100,288	16.4	44.1
100 - 199	490	10.2	68,563	11.2	139.9
200 - 499	399	8.3	125,010	20.5	313.3
500 or more	227	4.7	309,575	48.5	1,302.7
Totals	4,818		610,009		126.6

Source: Business Statistics Office

First, employment totals derived from each data source, ACE and the Scottish Council data bank, were compared for each local office area. This comparison revealed that in 88 of the 121 local office areas there was a strong degree of agreement between the two data sources. In most of these cases Scottish Council coverage was in excess of 80 per cent. Part of the

discrepancy for the remaining 33 local office areas stems from the comparison of the 1976 ACE totals with 1977 Scottish Council employment totals. It is likely that the coverage is in fact better than is indicated by these totals because more than 20,000 employees lost their jobs during 1977. Admittedly, this difference was in part compensated by the expansion and opening of other manufacturing plants (amongst others), but the overall level of cover is depressed.

Second, independent comparisons were also made between the ACE totals on the one hand, and the employment totals for those plants possessing a year of opening date and an employment breakdown on the other. The first comparison indicated that the coverage was marginally less than for those plants with employment totals. When each individual plant with a full employment breakdown into administrative, operative and other employment was taken and compared, the level of coverage was less comprehensive. In fact, there were only 45 local office areas in which the Scottish Council coverage was greater than 75 per cent. A further fifteen areas fell into the 70 - 75 per cent coverage category. This would suggest that the coverage for both the employment totals, and for the year of opening variable was reasonable, and might be used with caution. For the type of employment variable, coverage however was less comprehensive. By disaggregating each of these three comparisons, and when mapped-out, areas with "good" and "poor" coverage emerge. One area dominates these maps, Glasgow. Five of the local office areas that comprise Glasgow

City have "poor" coverage in all three cases (Kinning Park, Maryhill, Parkhead, Partick and Springburn). The "poor" coverage afforded to Glasgow City by the available data would not appear to unduly bias the data because other areas on the periphery of both Glasgow and Edinburgh, and in the outer lying areas of the Highlands also figure in the "poor" coverage category. And, while the distribution of "good" and "poor" is not random, there is no undue bias favouring one single set of areas at the expense of any other.

Another feature important at the local level is the industrial structure of each area. Comparisons were made between the ACE industrial order totals for each of the 121 local office areas for 1976 with the records of the Scottish Council. The comparison of industrial order totals is used as a surrogate measure for the size distribution of plants at the local level. While this measure is undoubtedly crude, it does give some indication of further possible weaknesses of the data used. In 38 of the 121 local office areas no major deficiencies exist, and employment coverage was 76 per cent or more in these areas. Of the remaining 83 local office areas, 45 had "poor" coverage for only one industrial order and in a further 22 this was the case for two industrial orders. The balance, 16 local office area, had "poor" coverage in three or more industrial orders and 13 of these areas were in the Glasgow Conurbation area (Alexandria, Barrhead, Bridgeton, Clydebank, East Kilbride, Glasgow South Side, Johnstone, Maryhill, Paisley, Parkhead, Partick, Port Glasgow and Springburn).

Perhaps more important than the immediate distribution of the numbers of industrial orders with "poor" coverage at the local level is the actual coverage of the industrial orders themselves. Two orders dominate if the number of times an order is mentioned with "poor" coverage is recorded for all of the 121 areas, and it is then totalled. These orders are food, drink and tobacco (SIC order 3) and mechanical engineering (SIC order 7), both of which are made-up of large numbers of small plants and firms. It could be argued that those areas recording "poor" coverage in these orders are also deficient in terms of the numbers of small plants and firms identified in these areas. This situation tends to add a bias in favour of the more recent industries (e.g. electronics and plastics), and may complicate further analyses. Furthermore, it is amongst the ranks of these small plants and firms that most of the new manufacturing firms are to be found. Thus, "poor" coverage in these orders could also indicate possible deficiencies in the number of new firms identified. Such deficiencies would tend to cause an underestimation of the birth rate of surviving new manufacturing firms in the data deficient areas. Despite this problem, the findings of the research reported in the following chapters lie in the realm of the possible and the probable, and would therefore suggest that these deficiencies do not unduly restrict the uses to which these data are put. Furthermore, the results and findings of the analyses compare favourably with studies undertaken to examine employment change in Scotland (SDD, 1978; MOAR et al, 1981).

In a final assessment, the size distribution of manufacturing plants in each industrial order in the Scottish Council data was compared with those of the Business Statistics Office. Two comparisons were made between all plants with employment data and the year of opening on the one hand, and the BSO data on the other. The details of these comparisons are listed in Table 2.4. The BSO figures are for 1975 and are the ones most recently available. The results of these comparisons reveal that the Scottish Council data does have some deficiencies especially in those orders in which small manufacturing plants are of relative importance. Because of these deficiencies, the Scottish Council data are aggregated up to the local office area level in further analyses. However, an attempt is made to construct a spatially disaggregated industrial model for the electronics and electrical engineering industry.

Despite these weaknesses, the Scottish Council data represents a unique collection of data with variables on a large number of manufacturing plants and firms in Scotland. These data are best regarded as a very large sample of all manufacturing plants and firms, and given the often low response rates to such surveys, it is surprisingly representative and offers "good" coverage in many areas and for most industrial orders. On a more pragmatic note, these data represent the only records available which could accommodate the type of analyses undertaken in the course of this study. The problems of biases and the attempts to reduce their size must be one of acceptance because no alternative source of information is either available, or

Table 2.4

Comparison of the Size Distribution of Plants in each Industrial Order: Business Statistics Office & the Scottish Council.

SIC[a]		Similar		Different	Significance (not different) 0.05	0.01
3	all[b]	-		Yes		
	Yest[c]	-		Yes		
5	all	Yes		-	x	x
	Yest	Yes		-	x	x
6	all	Yes		-	x	x
	Yest	-		Yes		
7	all	-		Yes		
	Yest	-		Yes		
8	all	Yes		-	x	x
	Yest	Yes		-	x	x
9	all	Yes		-	x	x
	Yest	Yes		-	x	x
10	all	Yes		-	x	x
	Yest	Yes		-	x	x
11	all	-		Yes		
	Yest	-	Yes	-	x	-
12	all	-		Yes		
	Yest	-		Yes		
13	all	-	Yes	-	x	-
	Yest	-		Yes		
14	all	Yes		-	x	x
	Yest	Yes		-	x	x
15	all	-		Yes		
	Yest	-		Yes		
16	all	Yes		-	x	x
	Yest	-	Yes	-	x	-
17	all	-		Yes		
	Yest	-		Yes		
18	all	-		Yes		
	Yest	-		Yes		
19	all	Yes		-	x	x
	Yest	Yes		-	x	x

Sources: Scottish Council (Development and Industry)
Business Statistics Office

[a] SIC 4 is excluded because of the BSO figures use only two size categories

[b] all = all of the manufacturing plants which can be allocated to an industrial order and for which employment data are available are allocated to six employment size categories and are compared by chi-square tests with the BSO distributions for 1975.

[c] Yest = as above, but only those manufacturing plants are included for which the year of opening is also available along with the employment totals as well.

accessible. (1) Furthermore, MacLennan and Parr (1979) have recently noted that:

> ... the development of theoretical approaches may have outstripped our capacity for empirical investigation. This has been due, in part, to the quality of regional and inter-regional statistics which, though considerably improved in recent years, are still inadequate for the kinds of analyses that need to be undertaken ... . (ibid., xv)

These sentiments are echoed by both Firn (1973) and Swales (1979). Use of the Scottish Council data, while not providing direct output information, does add several "new" variables to the study of new manufacturing firms and their formation e.g. year of opening, employment type, etc. In this respect this study can be regarded as innovatory, and is an attempt to examine some of the ideas suggested in recent works (FIRN, 1975; MASSEY, 1978a; SEGAL, 1979).

Throughout the analysis then, caution must be exercised and is voiced where the data might "explain" the phenomena under study. While these deficiencies do not restrict the analysis in the preliminary stages, they do prove insurmountable in the later stages where an attempt is made to combine features of the new manufacturing firm formation process with those of the local labour market. Overall, however, the benefits of using these data are considered to be greater than the losses.

2. THE LOCAL EMPLOYMENT ACCOUNTS OF THE DEPARTMENT OF EMPLOYMENT

Both the quality and usefulness of the local employment accounts of the Department of Employment for industrial research has been both questioned (LLOYD and DICKEN, 1968, 307) and debated (KEEBLE and HAUSER, 1971). Two recent texts by Buxton and Mackay (1977, 47 - 84) and Allen and Yuill (1978, 78 - 136) detail the methods of how the local employment accounts are constructed, and how these methods have changed through time. This section therefore does not detail these methods of construction, but instead highlights only those features which may materially affect the analyses.

During the ten year period, 1968 to 1977, the local employment accounts underwent two major changes. First, the 1958 method of industrial classification was modified and a new method was introduced in 1969. Second, in 1971 a switch occurred from the card count enumeration method to an annual census of (all) manufacturing plants. Employment fluctuations in 1971 might then be a product of this switch in the enumerating methods rather than being either an employment gain, or loss . However, from the records of the Department of Employment it is possible to construct two series of local employment accounts for each of these years, and so the size of the error introduced by these changes can be assessed. This type of comparison was conducted for both 1969 and 1971 to gauge the changes, and the error which they might introduce into the analyses. All of the correlation coefficients which were calculated between the two series of local employment accounts for each of these years lay in the

range 0.97 and 1.00. However, use of the local employment accounts at the industry level does create problems e.g. Wood (1976, 89) and Allen and Yuill (1977, 253; 1978, 125), but they do not constitute a problem for this study. It is only the sector totals which are used when the whole period is considered in the components of employment change analyses which are reported in the next chapter.

Elsewhere in the study, the local employment accounts have been used for single years (post-1971) and therefore does not cause any problems. In this chapter, the 1976 industrial order totals can be compared with the Scottish Council data because of the change in the method of their compilation. Under the card count system industrial order totals could be subject to fairly large errors, especially in the smallest areal units. However, under the annual census, where each manufacturing unit in an area reports its employment total to the Department of Employment, the resulting employment totals are not subject to the same margins of error, though caution is still necessary in some cases (DEPARTMENT OF EMPLOYMENT, 1978). Thus, the comparison between industrial order totals for each local office area is possible using 1976 data, but it is doubtful that this would in fact have been the case for the first years the census was conducted. For example, the problem of double job holding creates a problem in that employment positions are counted and not employees in an area (see ALDEN, 1971; DEPARTMENT OF EMPLOYMENT, 1978). However, these kinds of error would not appear to adversely affect the analyses presented in this study.

3. THE CLOSURE AND REDUNDANCY RECORDS OF THE DEPARTMENT OF EMPLOYMENT

To date only a few studies have made use of the Department of Employment's closure and redundancy records (e.g. FIRN, 1976; McVEAN, 1979a; TOWNSEND, 1981). Firn's study, for example, used these data in a secondary fashion to augment the already cretaed GURIE data bank (Glasgow University Register of Industrial Establishments; see FIRN, 1970). Other studies have used similar records, but they have mainly been concerned with plant closures (GRIPAIOS, 1977a and 1977b; DENNIS, 1978; CAMERON, I. , 1979). This study would appear to be one of the first to introduce a new source of data into industrial research, and its usefulness for research purposes, and more especially the present study, is commented upon below.

The closure and redundancy records of the Department of Employment represent a centrally held register (in the case of Scotland) detailing the loss of employment in all industries by whatever cause. Two of the three categories of job loss are used in this study, the third category, the temporary loss of employment (short time working and similar) is not used. For inclusion as either a "closure" or a "redundancy" (contraction of labour force not resulting in closure of the workplace) at least ten to twenty workers must lose their jobs respectively, though this criterion do not appear to be rigidly adhered to. McVean notes that it would appear "... that the coverage overall redundancies is more extensive in Scotland than in England and Wales so that missing observations are less important in the former case." (ibid, 1979, 1).

When a plant closes or a when an employer makes workers redundant, the manager of the local employment office is usually notified (I.P.M., 1980, 68). In turn, the manager notifies the Department of Employment, and it is from this information that the records are compiled. The upkeep of these records therefore relies upon both the employer shedding workers and the local employment office manager reporting the occurrence. Undoubtedly this "chain method" of reporting and recording employment loss is open to error. For example, redundancies might not be notified to the local office. However, the local manager sometimes augments the direct notices of redundancies received with his own personal knowledge of the situation.

A further complication can be introduced with the existence of the Temporary Employment Subsidy (TES) which can lead to the situation where two returns are made to the Department of Employment. One reports the loss of employment and the closure of a plant (if applicable; Form ED 955 followed by the monthly progress reports; ED956) and the other is an application for government aid to help retain those workers under threat of redundancy (Form HR1). There is therefore the possibility that a redundancy or plant closure might be recorded when in fact TES has been granted to the employer, and hence, no employment loss occurs. Every effort is made by the Manpower Services Commission, the part of the Department of Employment directly responsible for maintaining the records in Scotland, to prevent erroneous entries of this kind from occurring.

For each entry in the records, the address of the plant is recorded along with the number of female and male jobs lost. Other variables included are the size of the labour force prior to closure or contraction, the reason for the employment loss, the date of the loss, the industrial activity undertaken at the site concerned, and in some cases the location of ultimate ownership (CROSS, 1980). The last variable was not present in all cases and was added using the records of the Scottish Council (from previous national surveys) and company directories e.g. Who Owns Whom, Kompass, Dun and Bradstreet, Jordan Dataquest, etc.

Another complication arises from the actual use of these records. In their raw state these records can have several entries for the same plant in the same year. This situation can arise where an employer has made workers redundant on several occasions in the same year. Using the records without any form of modification would overstate the number of plants at which workers were made redundant. This problem was overcome by aggregating all such cases, and so the actual number of plants at which workers were made redundant could be established. Adopting this procedure, of course, means that the number of employees made redundant in any one instance is inflated. However, comparisons between both the raw and modified data reveals that there is no material difference between the two data sets.

A final series of complications arise from the fact that the data refer to notifications rather than to actual redundancies (and hence plant closures and contractions). It would appear

that the actual numbers of jobs lost is less than the numbers recorded on the notification forms. The Manpower Services Commission are at present investigating this discrepency. Finally, McVean (1979) in discussing this data source noted that notification was voluntary prior to 1976 and this situation continues only for very small scale redundancies. However, the main problems of under-notification occur in the construction, distribution, and commerce sectors. The Employment Protection Act requires the notification of redundancies of ten or more workers to be made to the Department of Employment, and so the problem with redundancies from small firms (and plants) still remains.

From these data it is possible to derive the number of workers made redundant by both plant closures and contractions for individual years (within the constraints of the data). For many other studies using data for two non-consecutive years it is the difference between two years separated by a varying number of years which is measured and therefore underestimates the real impact of plant contraction on the local labour market. Furthermore, it is hypothesised that the level of employment turbulence (level of involuntary quits) in an area might influence the number of new (manufacturing) firms formed in that area. These data would appear to be the only means of deriving such values for each local office area. Other data sources do exist and if access had been granted to them similar figures and measures could have been derived from them. Yet even such records as the Annual Census of Employment and SCOMER (Scottish

Manufacturing Establishments Records), only record one employment total for each plant per year, but this total may fluctuate throughout the year and will go unrecorded unless the employer has 200 or more employees at a single site. In the case of these medium and large plants, their fluctuating employment totals are recorded in an independently maintained set of records which are not combined (as yet) with either ACE, or SCOMER. The closure and redundancy records thus represent the only available source of data which allow some form of employment turbulence figure to be derived.

These records have the further advantage in that with minor modifications they can be used to perform a components of manufacturing employment change analysis. They also provide a valuable insight into the nature of plant contraction and the speed with which plants can move between employment size categories. In addition to this, the difference between the major ownership categories can be considered (CROSS, 1981, 116 - 22), and further extend the studies of corporate change across space and through time (see DICKEN and LLOYD, 1977; SMITH, 1978). While these records have their weaknesses in terms of the closure of small manufacturing plants, and hence inner city areas, the flexibility offered by other features of these data makes there use productive.

4. DATA SOURCES: A CONCLUSION

Neither the simple derivation of "facts", nor the reduction of measurement error are sufficient justifications for the use of any data source (see ACKOFF et al, 1962; DRAY, 1964). Yet, if the empiricist philosophy of Locke is adhered to, a philosophy which underpins the inductive method, no incentive exists to restrict observation to anything less than the whole universe (MEDAWAR, 1969, 29). It is therefore important to construct an a priori image of the real world based on the findings and failures of previous studies, an image of the possible and the probable. The assembled data represent a series of "facts" seen as relevant to the problem under examination. All three data sources detailed here are regarded as some of the relevant data for the study of the survival of new manufacturing firms, and their initial formation.

Further, to this discussion, McCrone (1965, 123) has stressed the many deficiencies of the statistics available at the regional level. While Johnston et al (1971) in the same vein noted that:

> ... private investigators have often had to try to fill the gaps in official data, and that their calculations have sometimes to use second-best rather than ideal methods ... (Yet) ... Scotland is better served than any other region of Britain ... (ibid., 30)

This study continues in this tradition and attempts not only to extend previous studies of manufacturing industry in Scotland e.g. LEA, 1977; TURNOCK, 1979), but also to contribute to the

understanding of regional development using Scotland as an example. (e.g. FIRN, 1975, 1977).

These three sets of data represents second-best in many cases, yet they possess advantages that, while not removing their inadequacies, certainly reduce them to manageable proportions especially in the light of the objectives of the study. In addition to the three data sets described in this chapter, other data sources are used to extend the analyses, and comment is made where relevant to their quality and means of derivation.

NOTES

1. Three other sources exist, and they are the records of the Health and Safety Executive (formerly the Factory Inspectorate), SCOMER, and ACE. Access to the Health and Safety Executive records was sought and while the regional office in Scotland was willing to make their records available their decision was overruled by the Executive's headoffice in London. In fact, in the series of correspondence held with the Executive it was noted that the Scottish Council's data were (and are) more complete and uptodate than their own records (LAIDLAW, 1977, personal communication). The remaining two sources of plant based data are not made generally available because of the Statistics of Trade Act of 1947 under whose auspices these data are collected. It is also worth noting that while access to any one of these three sources of plant based data would have provided a more comprehensive picture for a single year (or period in the case of the Health and Safety Executive records), none of them by themselves would have allowed the identification of new manufacturing firms, the nature of ownership, the type of employment in each plant, etc. Thus comprehensive coverage has been sacrificed for more detailed information of a smaller number of manufacturing plants. And, while government data is likely to be comprehensive, it is not free from inaccuracies (FIRN, 1975, 400). For a discussion of confidentiality and government statistics see Wynn (1978).

Chapter Three

SCOTLAND: THE COMPONENTS OF MANUFACTURING EMPLOYMENT CHANGE

INTRODUCTION

In assessing the size and hence the relative importance of new manufacturing firms in contributing to employment change, it is necessary to determine both the size and relative importance of the other components which account for the other changes in employment levels. It is the purpose of this chapter to undertake such an analysis, and thereby identify the spatial variations in the number of surviving new manufacturing firms across Scotland. The subsequent chapters seek to explain these variations.

The components of change approach is an employment accounting procedure which has been generally accepted as being a useful starting point for most employment change studies (WOOD, 1977, 5-6; 1978, 8; KEEBLE, 1978, 321-2). Recent studies of either full (GUDGIN, 1974, 1978; FIRN and HUGHES, 1973, 504) or partial (LLOYD and MASON, 1978; DICKEN and LLOYD, 1978; WOODWARD, 1978; N.R.S.T., 1975; S.D.D., 1977; DEPARTMENT OF EMPLOYMENT, no date; DENNIS, 1978; SCOTTISH ECONOMIC BULLETIN, 1977, 14-25; and SMITH, I., 1978) components of change analysis provide ample evidence for this belief. Such studies also provide useful material for comparative purposes, but such analyses must be treated with caution because of the varying nature of the data sources they have used. Despite these limitations these studies are used in a comparative manner where ever possible, and form an important

part of this chapter. The scale (spatial) adopted in the comparisons is mainly the Standard Region and in all cases the studies have been conducted within the U.K. While this approach is still subject to many problems in that these studies use a "wide range of definitions, sectors, sources and time-periods ... " (FIRN and SWALES, 1978, 201), it avoids the complications created by international comparisons, and so minimises the potential stumbling blocks noted by Sjoberg (1955, 110), Smelser (1968, 62-4), and Vallier (1971, 208). Yet, it cannot be assumed, without reservation, that the "events and situations we wish to explain are comparable" (SMELSER, 1968, 63) because the set of reference points adopted for this study may not hold for the different Standard Regions used (SJOBERG, 1955). For example, I.R. Carter (1974, 280) suggests that there are

> cultural differences between England and Scotland,

and that Scotland is more than an antediluvian province of England (ibid., 297; see POLLARD, 1975, 427). In spite of this problem, the comparisons are made in a qualitative rather than a quantitative fashion. But even this use of other findings is questionnable because of its simple-to-complex approach of reasoning (CHURCHMAN, 1954, 162-3). This last comment raises a huge area of debate and is dealt with elsewhere by Kempthorne et al (1964), Slater (1975), Castells and de Ipola (1976), and Gregory (1978) amongst others.

This chapter divides into several main areas of discussion. Initially, the nature of the data is discussed as they may affect the components of employment change analysis presented here.

Added to this section is a consideration of the various spatial scales at which the components of employment change can be detailed. Each of the components are then detailed at the national level. The remaining two sections of this chapter consider the spatial variations in the components of employment change at four different levels. Comparisons with other studies are made in these sections where ever possible, and explanation is sought at the scale the process is operating. A summary and conclusion unites the main findings of the foregoing analyses, and outlines the next stage of the analysis.

1. DATA: ESTIMATIONS AND AREAL UNITS

a. Estimations

It is thirty years since Kaplan (1948) considered the range of data required to obtain a comprehensive picture of the number of entries and exits of firms to and from the total stock of manufacturing plants. He stated that a study of these two components was only possible:

> If we could register every new enterprise, whether incorporated or not, with the record of its starting position - initial investment, number of owners and their former connections, number of employees, and other relevant data on its size and character - and if we had a similar registration for every business that closed, then we might draw some dependable conclusions on the relation between size and survival capacity. (KAPLAN, 1948, 54).

Unfortunately these data are not available, and all studies are therefore based on some form of sample. In some studies the samples used have nearly approximated the total stock of manufacturing plants (for Liverpool and Manchester, DICKEN and

LLOYD, 1978; for the East Midlands, GUDGIN, 1974, 1978), while in others they have been defined within certain limits (for Glasgow, FIRN, 1970). It is important as a consequence of the paucity of the available data to define the population to which the results apply, and in many cases even to decide which population the sample used actually relates (RIDGMAN, 1975, 9). The use of the closure and redundancy records maintained by the Department of Employment immediately introduces a degree of error. For example, these records represent the loss of employment of either ten, twenty, or more employees. The consequence of the adoption of these lower limits would therefore tend to underestimate the number of small manufacturing plants closing in the main cities (Glasgow, Edinburgh, Dundee, and Aberdeen). Suffice to say, the figures derived from the closure and redundancy records must only be regarded as best estimates, and not as an actual measurement of these components of manufacturing employment change.

Similar weaknesses could be documented for the data used to estimate the number of openings, and even the size of the manufacturing employment shift at the local office area level using ER II and ACE records (RICH, 1975, 188; ALLEN and YUILL, 1978, 119). But, despite the weaknesses of the data used, they provide the best available means (at the time of the study) for directly measuring the components of manufacturing employment change. Unfortunately, one of the components of change could not be measured, that of *in situ* expansion of plants and firms existing throughout the study period. It is therefore necessary

to estimate the size of this component from the knowledge of the other main components i.e. total employment change, employment gained due to openings, and employment lost due to both the closure and contraction of plants. Even by adopting this procedure not all of the problems are solved because it is still not known how many plants (and firms) both opened and closed during the 1968-77 period. However, there appears to be no immediate answer to this problem (i.e. data not available), and it is doubtful that the 109 plants identified as having opened and closed during the period are representative of all those plants existing for similar short intervals during the study period.

This study is not alone in being obliged to make some form of estimations. For example, Gudgin (1974, 1978), in his study of the East Midlands estimated the status of some plants (ibid., 1974, 438) and the "employment lost in those establishments which were in production in 1948 but which closed before 1967." (ibid., 1978, 58). In the sections that follow where the in situ expansion component has been estimated and found to be either misleading, or meaningless, it has been omitted.

b. Areal Units

The choice of a geographic unit for the purpose of defining the study area or as representing the basic, "best" unit for data aggregation is a universal problem faced by all geographic studies (HAGGETT, 1965, 177). This problem has been noted in various studies (CHISHOLM, 1960; DUNCAN et al, 1961), and has been recently reconsidered (OPENSHAW, 1976, 36-7; COOMBES et al,

1978). The search for the "best" or "base" geographic unit would probably prove as illusive as Winnie-the-Pooh's and Piglet's search for a woozle, and the definition of the "best" geographic unit would appear to depend upon the nature and scope of the study itself. The best geographic unit is therefore a product of the processes under study and the availability of data.

In the introduction to a recent statistical text, Johnston (1978, 2) asks the first of his two fundamental geographic questions: "Are there relationships between phenomena in various locations ?" He could have qualified this by two further questions asking about the problems of scale linkage and standardization. The problem of scale linkage concerns the transferring of patterns and processes noted as operational at one spatial level to another (HOARE, 1975, 43). As a consequence, this may lead to possibly spurious conclusions e.g. findings derived from national level linkage studies suggest that industries "... that have a high volume of goods moving between industries (and, by extrapolation, between firms within those industries) encourage their spatial proximity." (ibid). The basis for such an extrapolation is weak, and has more in common with the circular arguments used to explain the localization of the metal industries in the West Midlands than common sense (WOOD, 1973, 1). Because of this problem, Hoare (1971, 37) in studying the impact of London airport on the local area, believed it was "... crucial to examine the problem on a number of different geographical scales from the local borough to that of the South East as a whole." The present study, for this reason and for several others

outlined below, adopts a similar procedure and the geographical scales used range from the local employment office of the Department of Employment to that of Scotland as a whole.

Scale standardization has been the focus of recent attention, yet despite the work of Openshaw (1977, 470) "... it has yet to be established to what extent it is important to make allowance for the size of unit for which data is available." (sic, NORCLIFFE, 1970, 1.37). In recognition of Openshaw's warning, it is all the more necessary to link the "... appropriate level of analysis ... in the hypothesis formulation phase of the research." (SAWICKI, 1973, 114). Sawicki concludes that because the unit of analysis determines the results, it is important to use several analytical levels (ibid., 112 and 114). This study adopts several analytical levels , but even a multi-level analysis does not reduce the problem of the random disturbing variable. (BLALOCK, 1964, 99; HOARE, 1971, 39).

Perhaps the most important reason why several levels of analysis have adopted is because of the express need to link the emergence or non-emergence of the new enterprises (manufacturing firms) to other changes in the local economy; changes that are effected by forces operating at a level higher than, say, the local community. In effect, this means the reversing of Massey's (1975, 90) tree diagram of locational choices which was based on empirical work. The basic argument used to justify such an approach rests in part upon the concept of "seed-bed growth" (BANNOCK and DORAN, 1978, para. 5.2). In essence this concept postulates that the

emergence of completely new manufacturing firms (and their subsequent survival) is a function of the industrial structure of the immediately surrounding area. Consequently, factors affecting the local industrial environment may in turn affect the number of new manufacturing firms emerging. While the opening and closure of a few small manufacturing plants and firms may not dramatically change the local industrial environment, the opening or closure of a large employer may create a completely new local situation. The processes which have caused these changed local circumstances would certainly not have found their origin locally, but would have been generated by changes at either the regional, national or international level. Such changes are possibly a product of increased international competition, and hence a decresed demand for local products, and also the changing use of space made by modern manufacturing industry (MASSEY, 1976, 1978a, 1980; MASSEY and MEAGAN, 1977). It would therefore appear necessary to combine these levels of analysis as the latter clearly may affect the former. (see CHINITZ, 1961, 284 and 288).

The final levels of analysis used were as much a product of the above reasoning as they were of pragmatic considerations of data handling. (COLLINS, 1972, 100). The areal objects used in the analysis were not simple "areal aggregates" (CHAPMAN, 1977, 55), but have some degree of self-containment and represent functioning entities. (COOMBES et al, 1978, 1182). The two lowest levels used are the employment office (also called the employment exchange area or local office area - henceforth

written as LOA) and the travel-to-work-areas (also called labour market areas - henceforth written as LMA or TTWA) of the Department of Employment. The LOA is an administrative unit which is " ... centred on a separate town and in approximate terms corresponds to labour market areas for those towns." (GUDGIN, 1978, 74). In Gudgin's (1978) study of the East Midlands there were 37 LOAs (the West Midlands, for example, had 58 LOAs in 1966; WOOD, 1976, 74), while in Scotland there have been 135 LOAs open at some point during the study, but this total was reduced during the period to 121 due to amalgamations.

The next level of analysis uses the LMAs as defined by the Department of Employment and are subject to the limitations of aggregating LOAs. This procedure in all amalgamates 79 LOAs to produce 20 LMAs which with the remaining "self-contained" LOAs gave 62 LMAs. Other studies have produced varying numbers of LMAs for Scotland because they have used different criteria and data. For example, Smart (1974, 310-1) produced 45 LMAs (for criteria used see SMART, 1974, 261-77), while Lever (1978, 308) produced 31 LMAs (for criteria used see LEVER, 1978, 307). Neither of these figures are either correct, or incorrect, because they depend upon the criteria adopted. It is interesting to note that Lever (1978, 308) produces more LMAs for the East Midlands (26) than for the West Midlands (22) despite the large differences noted above in the number of LOAs between the two areas (21 in all). Furthermore, the difference noted in the number of LMAs for Scotland are of degree and not of kind because they represent attempts to define areal units that are

less arbitrary than the economic planning regions (for England, see JOHNSON et al, 1974, 33) or similar administrative areas (COOMBES et al, 1978, 1183).

Before proceeding to the next level of analysis, it is useful to define what an LMA represents. Even though the topic has attracted much attention (KERR, 1954; GOODMAN, 1970; HALL et al, 1973; SMART, 1974), the definition emerging differs only slightly and the generally accepted one "... is that of an area in which most workers can respond to job opportunities and change their jobs without changing their residences." (JOHNSON et al, 1974, 35). The LMA is therefore similar to the Daily Urban System (DUS) or Standard Metropolitan Labour Area (SMLA) except that the latter have different criteria for defining their areal extent. (see JOHNSON et al, 1974, 40; HALL, 1974, 386-7).

The third and fourth levels of analysis represent a compromise situation between the individual LMA and the whole of Scotland. These two levels are made-up of the nine administrative regions and a disaggregation of some of these regions - Strathclyde, Lothians, Tayside, and Grampian - into their main centres and their outer lying areas. In the case of Strathclyde, this disaggregation has led to five levels ranging from Glasgow City made-up of eleven LOAs to the whole of Strathclyde (53 LOAs). The resulting series of units, especially in the case of Glasgow City, Outer Glasgow, and the Clydeside Conurbation, approximate the main economic functional units of Scotland in terms of "within Scotland migration" (HOLLINGSWORTH, 1970; ROBERTSON, 1978) and self-contained employment centres.

The final level of analysis is the whole of Scotland which is used for two main reasons. First, it probably represents the initial level of search when a new location is sought for either a complete relocation of a plant or an expansion of a firm by the establishing of a branch or subsidiary plant. Scotland also represents a distinct economic unit whose location and boundary one would assume would be perceived with greater accuracy than those of the other assisted regions. (GREEN, 1977, 9-13). Second, in order to perform even the most simple of comparisons with findings of most other studies (the exception being GUDGIN, 1974, 1978), the results must be presented at the regional level.

2. COMPONENTS OF MANUFACTURING EMPLOYMENT CHANGE

a. The National Accounts

Before comparing the composition and changes of manufacturing employment in Scotland to those of four other regions (Industrial South Wales, the East Midlands, the Northern Region, and Cleveland County), it is first necessary to consider the Scottish situation in isolation. During the period under study, 1968-77, the level of manufacturing employment in Scotland decreased by over one hundred thousand (nearly a 15 per cent decline) leaving a little more than six hundred thousand people in manufacturing industry by 1976. Much of this decline would have been expected given the nature of manufacturing industry in Scotland in the period. (CROSS, 1981, 7-27).

Table 3.1

Composition of Manufacturing Employment in Scotland in 1977

	Employment			
	All Plants	%	Plants with Dates*	%
Permanent stock of plants	507,060	90.4	466,201	89.6
All new plants (1968-77)	54,138	9.7	54,138	10.4
Branch (local)	4,308	0.8	4,308	0.8
Branch (non-local)	37,636	6.7	37,636	7.2
New firms	12,194	2.2	12,194	2.3
Totals	561,198		520,339	

Source: Scottish Council (Development and Industry)

*Employment totals are used only where the year of opening is available in all cases unlike in the preceding column where all plants for which a year of opening is not available has been allocated to the permanent stock of plants.

The net employment change for the period understates the full nature of the decline because the gross level of employment change far exceeds net change (GUDGIN, 1978, 63). The composition of manufacturing employment in 1977 is presented in Table 3.1. Two series of figures are shown because of the methods of allocation used to construct the table. The major figures (All Plants) represents the complete allocation of all manufacturing plants and employment. This means the total figures for "permanent plants" includes those plants and their employment which could not be allocated to either a pre-, or post-1968 year of opening date. By adopting this procedure the relative importance of the employment contribution made by the opening of new plants of all types is slightly depressed. In order to correct for this situation, the figures have been recalculated using only those plants for which a year of opening

dates are available. Having made allowances for this possible source of error, there is little difference (relatively) between the two sets of figures.

The table (Table 3.1) and its contents suggest that the over-riding component in the provision of employment throughout the study period is the permanent stock of manufacturing plants. Yet, despite this relative and absolute importance of the permanent stock of plants, the employment contribution made by the opening of new plants, especially "immigrant plants", is not inconsiderable. Immigrant plants, as can be seen, provided more than 37,000 jobs by 1977, and it is probable that this total understates their full contribution in direct employment terms. Two pieces of evidence can be offered to support this statement. First, it appears to be generally accepted that most manufacturing firms move or open a branch plant for reasons of expansion (see CAMERON and CLARK, 1966; COLLINS, 1966; KEEBLE, 1968; SPOONER, 1972; DEPARTMENT of TRADE and INDUSTRY, 1973). Second, the available data suggests that the level of employment generated by immigrant plants is likely to reach 50-55,000 based on the growth records of the immigrant plants opening in the 1968 - 71 part of the study period. (CROSS, 1981, 157). It is also interesting to note that the employment created by new firms (manufacturing industry - 12,194) will probably not decline despite the expected closure of at least half of the number of new firms opening during the study period. This situation is likely to occur if the growth of the surviving new manufacturing firms equals that attained by the equivalent stock of new manufacturing firms opening in the preceding ten year period, 1958-67. (CROSS, 1981, 48).

Despite the valuable information which may be gleaned from knowing the composition of manufacturing employment at one moment in time, little knowledge is gained as to the real dynamics of manufacturing employment change. In order to gain some explanation and further knowledge of an area's employment dynamics it is necessary to know, besides the features noted above (Table 3.1), how much employment was lost by manufacturing plants either closing or contracting, and how much employment was gained by other plants expanding. This information is presented in Table 3.2 in the form of both measurements and estimates. The gross employment change exceeds the net employment change by at least 90,000 (measured value - henceforth written as "mv"), but it is in fact probably nearer to 145,000 (estimated value - henceforth written as "ev"). This large discrepancy of 55,000 is partially due to the incomplete coverage of the closures and contraction (redundancy) data collated by the Department of Employment (see Chapter Two, 28-32). It is because of this discrepancy that the calculated expansion figure is depressed to less than half its expected value. The expected value is based on the summing of the calculated expansion values of the 87 LOAs where it proved possible to calculate such a value.

It would appear that between 130,000 and 140,000 new manufacturing jobs were created over the ten year period (no estimation is included of those jobs deemed to be "new" within firms due to technical change, job redesign, or whatever), and the expansion of permanent plants provided 50 per cent or more of this new manufacturing employment. The relative importance of the

Table 3.2

Scotland: Components of Manufacturing Employment Change, 1968-77

Components	Employment Measured	Estimated
Total Lost:	195,922	(248,500)[a]
Plant closures	82,719	(123,500)
Plant contractions	113,203	(125,000)
Plant openings (total)	54,138	(70,833)
Plant expansion (*in situ*)	35,946[b]	(71,829)
Net Employment Change	-105,838	

[a]Estimates derived from year average values between 1966-74 (SCOTTISH ECONOMIC BULLETIN, 1977, 22).

[b]Value obtained by subtracting total employment change (105,838) from the total employment lost (195,922) and subtracting employment created by openings (54,138) from that total. However, this figure understates the employment created by expansion as it is depressed by the understatement of the number of jobs lost (approximately 50,000 too low) and an overestimation of the total employment change (see Chapter Two, 26-7). A third expansion figure has been produced by aggregating the expansion figures for the 87 LOAs (of a total of 121) where expansion values (or their equivalent) could be derived. The two largest errors occur in Glasgow City (10 LOAs) and in Edinburgh City (3 LOAs) where the net employment decline exceeded gross employment decline due to the coverage of the closure and redundancy data.

expansion of the permanent stock of plants varies according to which figures are used, the calculated, the expected, or the estimated. For the purposes of this discussion the expected expansion and measured openings figures are used. The relative importance of the four sources of new manufacturing employment is shown in Table 3.3 (overpage). Unfortunately, the expansion figures can not be disaggregated by either status, or ownership in order to give some indication of the source of this new manufacturing employment. (see SCOTTISH COUNCIL (DEVELOPMENT and INDUSTRY), 1977).

Table 3.3

Sources of New Manufacturing Employment in Scotland, 1968 - 77

Source	Employment Total	%
Total new employment	128,991	100.0
Openings (Total)	54,138	41.9
New firms	12,194	9.5
New branches of Scottish firms	4,308	3.3
Immigrant plants	37,636	29.2
Permanent plants expanding	74,853	58.0

Sources: Scottish Council (Development and Industry); Scottish Development Agency; Department of Employment; Regional and District Councils; New Town Development Corporations; Chambers of Commerce; and, the Ports Authorities.

Neither the presentation, nor the description of a single area's employment accounts can either explain, or even suggest why changes, such as those noted above, actually occur. It is the aim of the remainder of this chapter to begin to explain why and how these changes have occurred. One part of the explanation considers the reasons why manufacturing employment was lost, and this explanation also serves to illustrate the importance of considering the Scottish economy as an integral part of the U.K. economy. (CROSS, 1981, 100-14). A comparison of the components of manufacturing employment change for Scotland with those for other regions also forms part of this explanation, and is detailed in the following section. The remaining sections attempt to show where new manufacturing firms have been established and survived, and why spatial variations exist. The regional level comparisons are therefore looking at the issue: is it the whole of Scotland which is lacking in new manufacturing firms, or just specific parts of Scotland ?

b. A Comparison of Scotland with some UK Regions

The aim of this section is to compare the components of manufacturing employment change of Scotland with those of other regions of the U.K.. Unfortunately, sophisticated statistical comparisons between various series of findings from independent studies are not possible because of the constraints of the differing data sets used. The findings of four other studies are used here to suggest possible similarities, but at all times it is important to recognise their weaknesses for direct comparisons.

Table 3.4 (overpage) presents the findings of four components of manufacturing employment change studies. The main focus of attention is on the relative and absolute importance of new manufacturing firms (and which survived to be identified) to new immigrant manufacturing plants in providing new manufacturing employment opportunities. Each of the studies have used different data sources, each with their own problems of accuracy and definitions. Two features of the regions need also to be considered at this stage: first, the absolute size of the manufacturing labour force; and second, whether their manufacturing employment base was either expanding, or declining during the various study periods. Manufacturing employment in Scotland has declined continually since the war, while the other three regions have on average grown consistently, if one ignores the slight decline which occurred in all regions in the 1973-5 period.

Table 3.4

Components of Manufacturing Employment Change: Regional Comparisons

Region	Period	Openings		Contraction		
		Ind.	Imm.	Closures		Expansion
a.Northern	1961-71	8[a]	92			
		2,000	23,000			
b.Scotland	1968-77	22.5	77.5			
		12,194	41,944	82,719	113,203	74,853
c.E.Midlands	1947-67	52	48			
		65,240	60,580	- - 134,800 - -		107,180
d.Scotland	1950-74	- - 221,500 - - -		206,900	175,000	125,300
e.Cleveland County	1965-76	25.1	74.9			
		3,848	11,474	9,955	- - 16,704 - -	
f.Industrial South Wales	1966-74	16.7	83.3			
		(10)[b]	(50)			(40)

Sources: a. N.R.S.T., 1977; b. This study; c. Gudgin, 1974, 1978; d. Scottish Economic Bulletin, 1977; e. Storey and Robinson, 1979; f. Woodward, 1977.

[a]Percentage contribution made either by indigenous or immigrant (includes local branch and non-local branch plants) plant openings of the total employment created by all plant openings.

[b]Percentage contribution to all employment created during the 1966-74 period in Industrial South Wales.

Despite these limitations, one general finding is that in Scotland, in Industrial South Wales, in the Northern Region, and in Cleveland County, there is a dependence upon immigrant manufacturing plants for the provision of new manufacturing employment from plant openings. In complete contrast to this situation, the East Midlands relied more heavily upon employment created by the opening of new manufacturing firms. If this is due to more new manufacturing firms opening in the East Midlands, or that those that did open survived, is not clear at this stage. A similar situation was noted by Firn and Swales (1978, 208) in their comparative study of the West Midlands and Central Clydeside

conurbations. While the findings of this brief comparison do not validate the basic hypothesis examined by Firn and Swales (1978, 203), they certainly lend support to Gudgin's (1978) idea that:

> ... industrial birth-rates are higher in the core regions and this means that their industrial structure will almost constantly be the most favourable. A final step to complete the explanation would account for higher birth-rates in the core regions. ... potential causes might be a history of greater commercial intensity and of greater economic security. In the peripheral areas greater dependence on primary activities and primary processing was historically less secure, and perhaps as a result co-operatives and communal activities were more important. (ibid., 301).

Unfortunately, the other three main components of manufacturing employment change, closures, in situ expansion and contraction, are not fully explored by the studies listed, and so no comment can be made on them. However, the focus of the present study is the absolute and relative importance of new firms in regional development, and consequently of less immediate importance are the other components of manufacturing employment change. The major concern with the other components of manufacturing employment change is neither their relative, nor their absolute size, though these are important, but the manner in which they may affect the rate (number) and survival of new manufacturing firms. Again, none of the studies listed consider directly the impact of one or more components of manufacturing employment change upon the others because they have been in essence employment accounting exercises of an exploratory nature.

One conclusion which can be drawn from these regional comparisons, and one with great relevance to this study, is that there appears to be a distinct core-periphery pattern with respect to the relative importance of new manufacturing firms in the generation of new manufacturing employment. Such a conclusion must however be treated with caution because of the variety of data sources used and time periods studied. The only data source which would allow direct regional comparisons without the complication of data and temporal variability is the Annual Census of Employment. (Attempts have been made using VAT data - see GANGULY, 1982). The Department of Employment has allowed a number of studies to draw on these data e.g. Nunn (198_0), but has not as yet been made widely available.

c. Regional and Sub-regional Accounts

The various components of manufacturing employment change are described and examined at two aggregate levels in this section; the regional (9 areas) and the sub-regional levels (19 areas). Subdivisions have been made in the four major regions by removing their main cities. (see page 44). In all cases, the regions and sub-regions have been constructed by the initial grouping of the manufacturing employment accounts of each of the Department of Employment's local office areas which also form the basis of the local accounts presented in the next section.

The absolute and percentage manufacturing employment changes for each of the regions and sub-regions are detailed in Table 3.5 (overpage). The most striking feature of the table is the

Table 3.5

Changes in Manufacturing Employment in Scotland, 1968 - 76: Regional and Sub-regional Accounts

Region	Employment ('000s) 1968	1976	Shift	Percentage Change
Strathclyde	421	341	-80	-19.0
Glasgow City	167	120	-47	-28.4
Outer Glasgow	163	136	-28	-16.9
Clydeside	330	255	-75	-22.7
Outer Strathclyde	91	86	- 5	- 5.6
Lothian	83	65	-18	-21.3
Edinburgh	56	36	-20	-35.4
Outer Lothian	27	29	+ 2	+ 8.0
Tayside	58	46	-12	-20.1
Dundee	43	31	-12	-27.0
Outer Tayside	15	15	-	- 2.0
Grampian	40	37	- 3	- 8.6
Aberdeen	27	23	- 4	-14.4
Outer Grampian	13	13	+	+ 3.9
Central	42	36	- 5	-13.1
Fife	30	39	+ 9	+29.0
Borders	16	13	- 3	-18.4
South West	11	11	+ 1	+ 5.5
Highlands & Islands	8	14	+ 6	+80.9
Scotland	709	603	-106	-14.9

Source: Department of Employment (all figures are rounded to nearest '000.)

decline of manufacturing employment in almost all regions. In contrast to this overall decline is the growth of manufacturing employment in three regions, Fife, the South West, and the Highlands and Islands, and two sub-regions, Outer Grampian and Outer Lothian. Yet, only three of these five regions made significant absolute increases in their manufacturing employment

levels, Fife (8,737 increase), Highlands and Islands (6,426), and Outer Lothian (2,163). The sources of this employment growth is different in each of the three cases and is considered in the next section.

Beyond the simple dichotomy of either growth, or decline, is the distinct pattern formed by the relative sizes of the decline itself. All four of the major cities, Glasgow, Edinburgh, Dundee, and Aberdeen, are major centres of decline. Further out and away from these cities both the absolute and relative sizes of the declines decrease . The nature of the decline has a distinct core-periphery pattern in which the suburban areas have declined to a lesser extent than the cities upon which they are centred. This pattern of suburban "growth" has been noted at various times in previous studies in Scotland (CAMERON, 1973, 136; FIRN and HUGHES, 1973, 501-2; S.D.D., 1977) and has been a main feature of the industrial growth of other cities e.g. Amsterdam (KRUIJT, 1979); Paris (CAMERON, 1977, 147); Toronto (KERR and SPELT, 1958, 11-3; COLLINS, 1972, 85); Leicester (GUDGIN, 1974, 264); London and the South East (KEEBLE and HAUSER, 1972; KEEBLE, 1972a, 1972b, 1976, 269-73; WOOD, 1974, 142-9); and appears also to be the case in the U.S.A. (KING, 1975; ERICKSON, 1976, 1978).

The build-up of manufacturing employment in the suburban areas is due to the differential impact of the various components of manufacturing employment change. In essence, therefore, the differences in the manufacturing employment performance between the cities and their surrounding areas are due to differences in

the birth/death and expansion/contraction components and in the gain/loss of migrant plants. Yet, the development of suburban zones as areas of manufacturing importance has been seen as a decentralization of manufacturing activity from the city centre (MOSES and WILLIAMSON, 1967; KERR and SPELT, 1958, 14) — a decanting of manufacturing industrial growth from the 19th Century centres of manufacturing activity to the urban periphery. This has meant that:

> ... for many decades suburban and satellite areas around large cities have not only experienced rapid growth of indigenous firms (whatever their first origins), but have also provided a benign environment for the growth of new firms and for the attraction of increased investment from other regions. (WOOD, 1974a, 135)

It would therefore appear:

> ... legitimate to enquire whether other processes of change and sources of growth originating in the fringe zone itself have now achieved greater significance for the explanation of manufacturing trends. (ibid., 134)

Wood then continues, and considered that it was:

> ... no longer sensible to regard outer metropolitan areas merely as industrial satellites of the central city. (ibid., 135)

The results of disaggregating the changes of manufacturing employment for each of the regions and sub-regions (Table 3.6) reveals overwhelming support these comments (see S.D.D., 1978). However, it would be misleading not to discuss the importance of the relocation of manufacturing plants from city centres.

Although it has not been possible to derive accurate

Table 3.6

Components of Manufacturing Employment Change in Scotland, 1968-77: Regional and Sub-regional Accounts

Region	Employment 1968	Employment 1976	Shift	Closures	Contractions	Openings	Expansion[a]
Glasgow	167	120	-47	-21	-20	+ 4	+15
Outer Glasgow	163	136	-28	-18	-32	+10	+12
Clydeside	330	255	-75	-39	-52	+14	+ 2
Outer Strathclyde	91	85	- 5	-12	-18	+ 4	+21
Strathclyde	421	341	-80	-51	-70	+19	+55
Edinburgh	56	36	-20	- 4	- 2	+ 1	+ 7
Outer Lothian	27	30	+ 2	- 4	- 4	+ 3	+ 7
Lothian	83	65	-18	- 8	- 6	+ 5	+13
Dundee	43	31	-12	- 6	-10	+ 2	+ 2
Outer Tayside	15	15	-	- 2	- 1	+ 1	+ 2
Tayside	58	46	-12	- 8	-12	+ 4	+ 4
Aberdeen	27	23	- 4	- 2	- 2	+ 2	
Outer Grampian	13	13	+	-	- 2	+ 1	+ 3
Grampian	40	37	- 3	- 3	- 4	+ 3	+
Central	42	36	- 5	- 5	- 6	+ 3	+ 2
Fife	30	39	+ 9	- 3	- 7	+ 7	+11
Borders	16	13	- 3	- 2	- 2	+ 4	
South West	11	11	+ 1	- 1	- 1	+ 1	+ 1
Highlands & Islands	8	14	+ 6	- 2	- 4	+ 9	+ 4
Scotland	709	603	-106	-83	-113	+54	+75

Sources: Department of Employment; Scottish Council (Development and Industry); and surveys.

[a]In some cases data do not allow calculation of an expansion figures and in these cases total has been omitted.

(all figures have been rounded to the nearest '000.)

Table 3.7

Manufacturing Employment Lost in Glasgow and Edinburgh, 1966-71.

	Employment Lost			
	Plant Closures	Plant Moves from City	Stationary Contraction	Total Lost
Glasgow	20,609	2,572	16,865	40,046
Edinburgh	5,484	2,437	8,803	16,724

Source: S.D.D. (1977, Tables 1 and 2 combined)

statistics for the movement of manufacturing plants, it is possible to gain some indication of the relative importance of the movement of such plants in accounting for either employment gain or loss in the inner city from work undertaken by the S.D.D. (1977). The loss of employment due to the re-location of manufacturing plants from both Glasgow and Edinburgh is shown in Table 3.7 (above). It is apparent that there are differences in the relative importance of the relocation of manufacturing plants in accounting for manufacturing employment lost in these two cities. For Glasgow, 6.4 per cent of all manufacturing employment lost was due to manufacturing plants leaving the city, while for Edinburgh the comparable figure is 14.6 per cent. Thus, relocation accounted for a larger share of manufacturing employment lost in Edinburgh (31.1 per cent) than in Glasgow (11.1 per cent). The situation in Manchester is similar, where 7.1 per cent of all manufacturing employment lost was due to plant relocation, and 9.6 per cent of manufacturing plants closing moved out of the city. A major difference between the Scottish and Manchester cases is the greater importance of plant contraction in the Scottish cases in

accounting for manufacturing employment lost (LLOYD and MASON, 1978, 80). Detailed consideration of the relocation of plants in both Glasgow and Edinburgh has been documented elsewhere (Glasgow: HENDERSON, 1974; Edinburgh: SESDA, 1973; GHODGERI, 1974) and will not therefore be further elaborated upon here.

In switching the attention away from the cities themselves to their surrounding areas, the importance of new manufacturing plants i.e. moving plants into these areas and the setting-up of completely new manufacturing firms, is evident in accounting for recent employment (manufacturing) growth of these areas. However, the failure of the cities to either attract manufacturing plants, or to develop new manufacturing firms does not hold for either Aberdeen, or Dundee, both of which gained more manufacturing employment from the opening of new manufacturing plants than their surrounding areas. The four areas surrounding each of the major cities therefore form two distinct groups. The areas surrounding both Glasgow and Edinburgh declined less than the cities upon which they are centred because their manufacturing stock not only decreased to a far lesser extent, but they also achieved a far higher degree of "success" in attracting and developing new manufacturing firms and plants. This situation is in complete contrast to the position found in both Aberdeen and Dundee. The surrounding areas for both of these cities fared better in manufacturing employment terms because their manufacturing stock declined less than the cities upon which they are centred.

It is tempting to conclude that the processes leading to the development of the suburban areas surrounding both Glasgow and Edinburgh have been operating for a much longer time period than in the areas surrounding both Aberdeen and Dundee. In fact, the balance between Glasgow and its surrounding area is such that the surrounding area is now more important than the city itself in terms of absolute manufacturing employment. Edinburgh has not yet reached this position, but the relative and absolute importance of its surrounding area has increased over the period such that in 1968 it housed 32.4 per cent of all manufacturing employment in the Lothian region, and by 1976 this had increased to 44.5 per cent. While the forces operating to spatially readjust the distribution of industry may be internal to industry, one should not underestimate the effect of national policies encouraging this pattern of suburban growth e.g. local transport policy (DAVIDSON, 1967, 18; SMART, 1974, 245), industrial estates provision (WELCH, 1970, 142-3), etc. The point being made here is that institutional planning has had (and is having) a direct impact upon the development and location of housing, industrial estates, and in the provision of transport, and indirectly upon industry itself. Thus, the suburban development of manufacturing industry has not happened in isolation or independently of other changes, and in fact the recent "rounds" of industrial investment are attempting to make the best possible use of the factors of production, the distribution of which has been changing.

The changing distribution of manufacturing industry is also a response by industry itself to the real or apparent changes in

the distribution of the comparative advantages for production. An evaluation of the comparative advantages (in spatial terms) has meant that the previously locationally restricting supply factors of production often no longer apply. The result of this situation might increase the locational flexibility exhibited by industry. Moreover, two other factors must also be noted at this stage. Technological change, for example, can have a dramatic impact upon the very nature of the production process itself and the product being made. These changes in turn create a new, and possibly different demand for labour. For example, it has been noted that the:

> Skillful decomposition of activities, and an education and occupational training system well tuned to the pattern of decomposition, permit a great reduction in the amount of knowledge that must be specific to any particular activity. (NELSON et al, 1967, 12)

The electronics industry is often offered as one example of this deskilling process (FIRN, 1975, 411; MASSEY, 1978a, 9; SDA, 1979), yet evidence is still lacking on this topic (see TOWNSEND et al, 1978). Some evidence exists from work undertaken in the U.S.A. though it might not be transferrable to the U.K. situation (BRIGHT, 1958, 189; NELSON et al, 1967, 140, 145; THOMAS, 1979).

With a possible reduction of the demand made by industry for skilled labour, the emphasis changes to a direct requirement for labour <u>per se</u>. Thus, allied to the tight labour markets which have existed in the South East of England and the West Midlands and the regional policy inducements which have been available at least since 1945, industry has been able to meet its demands

for labour in such assisted areas as South Wales and Scotland. Such labour has been more specifically available in the newly created (then) New Towns and large sub-urban industrial estates. This shift in location of industry has occurred inspite of the ready availability of premises in inner city areas e.g. Glasgow (C.J. CARTER, 1974, 25).

This section has examined in general terms the components of manufacturing employment change at the regional and sub-regional level within Scotland. It has been shown with reference to the varying importance of the components involved that there would appear to be areas with more new manufacturing firms, or at least areas with favourable economic conditions enhancing their prospects for survival. From the analyses presented, it is evident that it is the suburban and rural areas which possess the greatest number of new manufacturing firms and plants, and that the inner city areas are "lacking" such additions to their manufacturing stock in comparison. Why is this so ? The following section analyses employment change at the local level to see if those areas "with new manufacturing firms" differ in kind, or in substance from those areas "without new manufacturing firms". The leads developed in the course of these analyses are then further examined in the following chapters with specific reference to the role of industrial structure and the factors which might influence the supply of people able (and willing) to establish a new manufacturing firm.

d. Local Accounts

The marked variations in manufacturing employment performance between the regions and sub-regions are the product of large local variations. It is the object of this section to discuss these variations in greater detail and to indicate some of the characteristics of the areas "with" and "without" new manufacturing firms and plants.

At the local level several striking features emerge. First, of the 106 LOAs used in the analysis, there has been an increase in manufacturing employment in 47, and a decrease in the remaining 59. The total manufacturing employment increase in these 47 expanding areas is nearly 38,000, while the number of manufacturing jobs lost in the other 59 declining areas is a little under 142,000. Second, only 11 of the expanding areas increased their levels of manufacturing employment by 1,000 or more: these LOAs are (all figures rounded to nearest '00.) Broxburn (2,700) and Livingston (3,500) in West Lothian; Dumfermline (2,600), Inverkeithing (1,200), and Kirkcaldy (4,200) in Fife; the new towns of Irvine (1,800) and East Kilbride (2,700); Invergordon (4,300) and Inverness (1,900) in the Highlands and Islands; and Cambuslang (1,700) and Kilwinning (2,300) in Strathclyde. Two other areas expanded by nearly a 1,000 and these are both in Fife: Glenrothes (900) and Leven (1000). It is immediately evident that the better performance of the Outer Lothians, for example, is the result of employment growth in Broxburn and Livingston, and was not equally spread throughout Outer Lothians. Other LOAs in the Lothians did record increases

in their manufacturing employment levels - Haddington (250), Tranent (50) and Linlithgow (150, now in Central Region) - but were negligible in comparison to the employment increases in both Broxburn and Livingston in West Lothian.

The above apportionment of growth can similarly be made for the other regions. In Strathclyde, for example, Cambuslang and East Kilbride are located in the area termed Outer Glasgow, while Irvine and Kilwinning are in Outer Strathclyde. The growth of these four areas on aggregation tends to partially cancel out the decline in manufacturing employment in other LOAs. In Strathclyde, excluding Glasgow, 13 LOAs have recorded large declines in their manufacturing employment levels (losses of over 1,000 jobs). These declines occurred in Airdrie (-3,800), Alexandria (-1,600), Clydebank (-9,000), Coatbridge (-2,500), Hamilton (-2,600), Johnstone (-1,900), Kilmarnock (- 2,000), Larkhall (-1,300), Motherwell (-1,400), Paisley (-3,200), Renfrew (-2,900), Wishaw (-1,500), and Saltcoats (-2,200). The level of manufacturing employment in these 13 LOAs decreased by a total of nearly 36,000, only 11,500 less than the total decline of Glasgow City itself. It is therefore important to note that although the absolute decline of Glasgow City is far greater than any other area, in relative (percentage) terms its decline has been no more dramatic than has occurred elsewhere. Table 3.8 details the percentage change in manufacturing employment for each of the 106 LOAs, and it is evident that the 28.4 per cent decline of Glasgow City is not an isolated case. In fact, six areas adjacent or nearly adjacent to Glasgow City have suffered similar

Table 3.8

Percentage Employment Change at the Local Level in Scotland, 1968 - 76.

Percentage Employment Change	Size of Change	No. of Local Office Areas
	41+	2
	31 - 40	10
Decline (-)	21 - 30	21
	11 - 20	16
	1 - 10	10
	NO CHANGE	
	1 - 10	12
	11 - 20	9
Increase (+)	21 - 30	8
	31 - 40	6
	41+	12

Source: Department of Employment

relative sized declines e.g. Airdrie (-32 per cent), Clydebank (-38), Coatbridge (-23), Hamilton (-26), Larkhall (-39), and Wishaw (-25). The nature of the decline in these six areas vary according to the structure of their local industrial base. The loss of employment by plant contraction is more important in all six cases than the loss by plant closure. Both Clydebank and Coatbridge have older industrial bases than the other four areas and , the closure of plants in these two areas in accounting for employment loss is relatively more important than in the other four areas (Airdrie, Hamilton, Larkhall, and Wishaw).

If one extends these analyses to include all of the older and larger manufacturing areas (LOAs with 10,000 or more employed in

manufacturing industry, and this excludes Bathgate, East Kilbride, Dunfermline, and Glenrothes) a similar situation is revealed. In only one case are plant closures more important than plant contraction in accounting for employment loss, and this area is Paisley. Nine further areas are added by using th s criteri and together with the six areas noted above and the four major cities they account for over 350,000, or nearly 60 per cent of all manufacturing employment lost in Scotland (in 1976). The point being made here is that the decline in manufacturing employment is not only found in the inner city, but is in fact common in all of the older industrial areas. The balance between plant closures and plant contractions in accounting for employment lost is a product of the industrial structure, the size distribution of plants in an area, and the age of investment they represent. For example, in Kilmarnock nearly 9,700 or 67 per cent of the manufacturing workforce are employed in only six plants. Consequently, both the fortunes of Kilmarnock and the balance between plant closures and plant contractions in accounting for employment lost is influenced by, if not dependent upon, the actions of these six large plants (each employed in 1976, 700 or more employees). A similar situation also exists, though to varying degrees, in each of the other eight areas (Alloa, Ayr, Falkirk, Greenock, Johnstone, Motherwell, Paisley, and Renfrew). The inclusion of Johnstone and the exclusion of Bathgate might appear arbitrary especially as at the time of the study were both dominated by large vehicle assembly plants which employ most of the local workforce (62 per cent in Bathgate; 72 per cent in Johnstone). The difference between

these two areas lies in the age of the manufacturing plants in both. In Bathgate, 35 per cent of plants were open prior to 1939, while in Johnstone it is 57 per cent, and it is on this basis that Johnstone was included and not Bathgate.

The comments made above have concerned both the size and the direction of employment change and only a few brief comments have been made as to the relative importance of the other components of manufacturing employment change. At this juncture, then, the discussion can turn to a consideration of "openings", and specifically new manufacturing firms. Several questions can be posed to help direct the discussion: where is the creation of new employment by the opening of plants greater than the provision of new employment by the expansion of the existing stock of plants, or vice versa ? Where is the loss of employment by the closing of plants greater than that lost by the contraction of the existing stock of plants, or vice versa ? Furthermore, is there any relationship between the number of plants opening and closing within an area ? And, which combination of components is most likely to result in an overall expansion of the manufacturing employment base ? Some of these questions are generally answered by the data presented in Tables 3.9 and 3.10 which detail the dominant components of either employment gain or loss at the local level. Perhaps the most striking feature to emerge from these tables is the importance of changes in the employment of the plants existing throughout the 1968-77 period. The opening of new plants has undoubtedly made an important contribution to employment generation and employment change, but the bulk of

Table 3.9

Dominant Components of Manufacturing Employment Gain and Loss in Scotland, 1968 - 77: Local Accounts

Dominant Components of Employment Change	No. of Local Office Areas Expanded	Contracted	Total
Openings GT Expansion	14	31	45
Expansion GT Openings	30	29	59
			104[a]
Closure GT Contraction	17	27	44
Contraction GT Closure	25	30	55
			99[b]

[a]Data are not available in one case, and in the case of Thurso, the level of employment generated by expansion and openings is equal.

[b]Data are not available in seven cases.

Table 3.10

Dominant Component Mixes of Manufacturing Employment Change in Scotland, 1968 - 77: Local Accounts

Dominant Components	No. of Local Office Areas Expanded	Contracted	Total
Openings & Contraction	5	14	19
Expansion & Contraction	20	15	35
Expansion & Closures	10	12	22
Openings & Closures	6	15	21
Totals	41	56	97[a]

[a]Data are not available in nine cases.

employment change has resulted from the expansion, contraction, and closure of existing plants.(plants existing throughout the study period). Though in the short term this mix of components may result in the greatest numbers of jobs being generated, it is unlikely in the long term that this mix of components would in fact ensure the continued growth of an area. It seems generally agreed that the opening of new manufacturing plants and more especially the formation of wholly new manufacturing firms (often termed indigenous enterprises) is important to an area's development. (BEESLEY, 1955, 49; BAUMOL, 1968, 69; LIGGINS, 1977, 94; FIRN and SWALES, 1978, 299). Yet, despite assurances that new manufacturing firms are so important to an area's development, there is a distinct lack of empirical evidence (except GUDGIN, 1974, 1978) and few, if any, attempts at deriving a theory of new firm formation and entrepreneurship (except BAUMOL, 1968, 70-1; LEIBENSTEIN, 1978, 39-55). It is both of these topics that the following chapters address themselves.

Only one traditional industrial area, Clydebank, had any of its components of employment change dominated by the action of one firm. All of the other areas where the action of a single plant dominated any of the components are largely non-industrial and rural. For both Inverness and Invergordon the actions of two plants in either case were responsible for their large employment gains. Perhaps rather surprisingly the gain of employment from a single new manufacturing firm dominates all employment gained in two places, Burntisland in Fife and Campbeltown on the Kintyre peninsula. Moreover, in both of these cases the new firms are

shipbuilding concerns. Other areas where the opening of single branch plants dominated the supply of new manufacturing jobs are Annan, Kirkcaldy, Inverurie, Saltcoats, Portree, and Brechin.

Turning to consider where the loss of employment is dominated by the closure of a single plant, only six areas emerge: Blairgowrie, Cupar, Kilburnie, Troon, Brechin, and Helensburgh. In the cases of both Blairgowrie and Helensburgh the total loss of employment by plant contraction is also due to the actions of one plant. The erratic and dominant actions of one or two plants is mainly restricted to rural areas and is similar to the findings of Gudgin (1978, 84-5).

As would be expected at such a disaggregated level, the variations are great, but several distinct patterns do appear to emerge. For example, the areas where employment created by the opening of new manufacturing firms is more important, in absolute employment terms, than the opening of other plants, tended to be in the previously non-industrial areas. Areas such as Thurso, Wick, Fort William, Campbeltown, Dunoon, and Rothesay would fall into this category. There were also previously industrial areas where this was also the case e.g. Ayr, Loanhead, Linlithgow, Paisley, and Musselburgh. Plant openings generally tended to be more important than the expansion of existing plants in areas where the existing industrial base was relatively small, and was still receiving the inward movement of branch plants e.g. Dunfermline, Glenrothes, Dalkeith, Tranent, Selkirk, Peebles, Hawick, and Kelso. Perhaps surprisingly, in both Dundee and

Aberdeen the greatest supply of new manufacturing employment came from the opening of new, non-local branch plants mainly connected with the exploitation of the North Sea. The reliance upon the expansion of the existing manufacturing base therefore still remains the major supplier of new manufacturing employment in the older industrial areas such as Glasgow, Edinburgh, Renfrew, Paisley, Barrhead, Falkirk, and Denny. Other areas which have attracted large numbers of in-coming branch plants e.g. Irvine, East Kilbride, and Livingston (all new towns) all experienced major gains from both the expansion and the opening of plants, but the former process has made the major contribution to their employment gains over the 1968-77 period. In contrast to this situation both Cumbernauld and Glenrothes gained more manufacturing employment from plants opening rather than from plants expanding.

Employment lost by plant closures also shows two distinct distributions. First, there are those areas which represent the old traditional industrial centres that are now declining as a direct result of the reduction of their manufacturing industrial base e.g. Glasgow, Edinburgh, Rutherglen, Paisley, and Barrhead. Second, there are those areas with a small industrial base and whose plants tend to be small e.g. Inverness, Forres, Nairn, Thurso, Wick, Fort William, Campbeltown, and Rothesay. A third element of this distribution is the employment lost due to plant contraction which also has a distinct distribution. Encircling the traditional manufacturing zones of Glasgow lie the areas that have received many of the initial in-coming branch plants and are

therefore strongly represented in the "newer" industries. This would include the areas of Dumbarton, Alexandria, Johnstone, Port Glasgow, Hamilton, East Kilbride, Cambuslang, Uddington, Wishaw, and Cumbernauld. A similar position also exists in Fife, West Lothian, the Falkirk-Grangemouth area, and also both Dundee and Aberdeen.

Based on the above observations, the four components of manufacturing employment change considered here can be combined into four sets of dominant component mixes (as in Table 3.11). In each case these component mixes account for the majority of both employment gains and losses. A most striking distribution emerges when the expansion and contraction components are considered in terms of the Central Lowlands. Areas with this mix of dominant components encircle Glasgow City in the form of a horseshoe. The limits of this horseshoe run from Helensburgh and Alexandria in the north west, to Newmilns in the south, goes north east to Airdrie and Denny, taking in the block of areas running from East Kilbride to Shotts, and south to Larkhall. In the remoter areas, the actions of a few firms can account for the expansion or contraction of manufacturing employment e.g. Fort William, Invergordon, Fraserburgh, Blairgowrie, and even Dunfermline and Kirkcaldy. The remaining three component mixes of manufacturing employment change do not reveal distinct patterns. This is partly due to there being so few areas in each category, but even so, this does not detract from the fact that there appears to be an underlying national pattern. A pattern centred upon the older industrial areas, their surrounding areas, and the more recently developed areas.

Table 3.11

Dominant Component Mixes of Manufacturing Employment Change: A Categorization by the Age and Size of an Area's Industrial Base

Age of Industrial Base	Dominant Components of Manufacturing Employment Change		
		Industrial Base	
		Large	Small
New	Openings	Contraction	Closure
Recent	Expansion	Contraction	
Old	Expansion	Contraction/Closure	

Source: See text

It could then be suggested that there there are relationships between an individual component, the combined components of manufacturing employment change, and the overall age of an area's industrial base. A simple typology can be derived for this situation and is detailed in Table 3.11. The basic idea behind this table is that the build-up of manufacturing industry in a region does not reveal spatial continuity at the sub-regional, or local levels e.g. a shift from the inner city to the surrounding suburban area. It is this discontinuous development of industry within a region which leads to the spatial variations in the various components of manufacturing employment change described in this chapter. Furthermore, it would appear that the most important component underlying these variations is the spatial discontinuity in the emergence of new manufacturing firms and the opening of new branch and subsidiary plants. Both local areas and regions could therefore be seen as having lifecycles, a lifecycle

of manufacturing development and growth which is dependent upon a constant supply of investment going into the expansion of existing firms and plants, or in the opening of new plants and the establishment of new firms.

3. SUMMARY AND CONCLUSIONS

This chapter has examined the various components of manufacturing employment change and has shown by the use of various levels of analysis that either the growth or the decline of manufacturing employment in an area is a product of several components acting in unison. Moreover, it has been shown that the major components accounting for the greater part of either employment gain or loss have a distinct spatial distribution. The distribution of the expansion and contraction of plants suggested a probable association with the age of the plants and firms in the area. Hence, at any one time there are dominant mixes of components which account for the bulk of employment change in an area, and the make-up of the mix of components is dependent upon the previous level of investment in the area in preceding periods. Also important is the size of the existing industrial base and size distribution of plants which go to make it up. The lack of continuity of investment in manufacturing industry in an area tends to lead to the prolonged dominance of single mixes of components. For example, in Fife, in West Lothian, and in the South Eastern periphery of Glasgow where in the 1950s and 1960s most of the new manufacturing employment was created by the opening of new plants and the establishment of new firms (of lesser importance). These new plants were also located in

"new" locations with relatively little previous industrial investment. By the late 1960s and early 1970s a sizeable industrial base had been established in each of these three areas, and the balance of new manufacturing employment generation shifted from the opening of new plants and firms to the expansion of the recently opened plants and firms. The loss of employment could likewise be described with plant closures and contractions changing places as the dominant components. (for UK view see KEEBLE, 1976, 155-6).

In terms of new manufacturing firms, the present chapter has managed to locate the bulk of them in areas away from the traditional centres of manufacturing activity in mainly rural and suburban locations. Furthermore, the types of areas with greatest numbers of surviving new manufacturing firms have relatively small industrial bases, are growing in manufacturing employment terms, and tend not to be dominated by a single or a few large employers. These areas also are those areas which have experienced the greatest in-flow of population from "within Scotland" migration. All of these points help shape the explanation of the spatial variations in the numbers of new manufacturing firms opening and surviving during the 1968-77 period. These points are now taken as indicators as to the type of environment or labour market favouring new manufacturing firm formation, and which are developed in the following two chapters with reference to industrial structure and the supply of new manufacturing firm founders.

Chapter Four

INDUSTRIAL STRUCTURE AND NEW MANUFACTURING FIRM FORMATION IN SCOTLAND

The purpose of this chapter is to build on the indications emerging from the previous chapter of the possible relationships between the emergence and survival of new manufacturing firms and the "local" industrial structure. In this chapter the number of new manufacturing firms in each of the major industrial orders is established, a crude birth rate of new manufacturing firms calculated, and then a series of hypotheses are examined which relate the numbers of new manufacturing firms and elements of the structure of each industry.

The wide range of industries entered by new manufacturing firms is detailed in Table 4.1. Despite the large variety of industries entered , a few industrial orders account for the bulk of new entrants. Over 59 per cent of new manufacturing firms entered only five industrial orders: Food, drink and tobacco; mechanical engineering; other metal manufacturing; textiles; and other manufacturing. In all these five orders account for nearly 63 per cent of all employment generated by new manufacturing firms in Scotland.

One important question which arises from this concentration of entry concerns the entry and survival of new manufacturing firms into growing and declining industries (in terms of employment). (FIRN and HUGHES, 1974, 505-14; FIRN, 1975, 398). In fact, Firn (1975, 398) has noted that " ... new local enterprises set-

Table 4.1

Industry Types of New Manufacturing Firms in Scotland, 1968 - 77

Industry by SIC	New Manufacturing Firms Employment	Number
3 Food, drink & tobacco	1,442	35
4 Coal products	9	1
5 Chemicals	131	13
6 Metal manufacture	342	9
7 Mechanical engineering	2,116	64
8 Instrument engineering	178	15
9 Electrical engineering	711	32
10 Shipbuilding	424	11
11 Vehicles	263	14
12 Other metal manufacture	1,681	88
13 Textiles	1,171	44
14 Leather & leather goods	74	5
15 Clothing & footwear	759	20
16 Bricks, pottery, glass	282	24
17 Timber & furniture	967	34
18 Paper & printing	403	28
19 Other manufacturing	1,242	68
Total	12,194	504

Source: Scottish Council (Development and Industry); Surveys.

up by local entrepreneurs are biased toward those industrial sectors that are in decline both locally and nationally." This analysis of Firn concerned the setting-up of new enterprises in the Clydeside conurbation during the period 1958-68. During the period 1958-68 the number of expanding industries (in terms of employment at the mlh level) was far greater than during the present study period, 1968-77. At the local level (Scotland)

there were 41 expanding industries and 6 static ones, while at the national level (UK) there were 48 expanding industries and one static one. Today (1968 - 77 period), the situation is somewhat different with only half as many expanding industries

Underlying the above discussion is the idea that the expansion of the numbers employed in an industrial activity indicates a concurrent growth in demand for that industry's products and services. If, then, demand is increasing, the existing number of firms will increase their output to match this new level of demand. Of course, in the initial stages demand might outstrip supply, and so leave open some unsatisfied markets. It is into these markets that new manufacturing firms could enter and sell their products and services. Moreover, the likelihood of both succeeding and surviving in an expanding market is possibly far greater because inter-firm competition would tend to be less severe than in a static or declining market situation, and investment funds are often easier to come by in an expanding industry. (see NASON, 1963). Thus, it could be hypothesised *a priori* that the number of new manufacturing firms entering and surviving in an expanding industry will be greater than in a declining one, and that an entrepreneur would consider his (or her) chances of "success" to be much better in such an expanding industry also. Yet, many of the new manufacturing firms have been established in what are generally regarded as "declining" industries, and so are unlikely to diversify their local economies.

There are a series of hypotheses which can be put forward in an attempt to account for these industrial variations in entry rates. The hypotheses used here divide into three main groups: barriers-to-entry, industrial characteristics, and factors of supply. The measure used to express the rate of entry relates the number of surviving new manufacturing firms in an industry to the numbers employed in that industry at the beginning of the study period. To express this figure in a standardised form, the entry rate of surviving new manufacturing firms is taken as the number of such firms per thousand employees in 1968. Even though the majority of new manufacturing firms are established by "teams" and so might encourage the use of a measure expressing the number of founders per 1,000 employees in an industry instead, the entry rate using the number of firms themselves is used. (see Table 4.2 and the "General Note" at its foot).

1. Barriers-to-Entry Hypotheses

Five main sub-hypotheses are used here and these are:

a. The rate of entry of new manufacturing firms and their survival is directly related to the cost of entry. It is therefore expected that the less it costs to set-up in an industry the greater will be the number of firms setting-up in that industry.

b. The rate of entry of new manufacturing firms and their survival is inversely related to the proportion of employment in plants employing 500 or more employees in that industry. (CHINITZ's hypothesis).

c. The greater the proportion of plants employing between 11 and 19 employees (small plants and firms) in an industry, the higher will be the rate of entry of new manufacturing firms and their survival.

Table 4.2

Average Birth Rates for Surviving New Manufacturing Firms in Scotland, 1968 - 77

Industry by SIC	Entry Rate
3 Food, drink, tobacco	0.04
4 Coal products	0.05
5 Chemicals	0.04
6 Metal manufacture	0.02
7 Mechanical engineering	0.06
8 Instrument engineering	0.09
9 Electrical engineering	0.07
10 Shipbuilding	0.02
11 Vehicles	0.04
12 Other metal manufacture	0.30
13 Textiles	0.05
14 Leather & leather goods	0.17
15 Clothing & footwear	0.07
16 Bricks, pottery, glass	0.10
17 Timber & furniture	0.15
18 Paper & printing	0.05
19 Other manufacturing	0.45
Mean	0.10
Median	0.04
Standard Deviation	0.11
Standard Error	0.03

Entry rate = Number of surviving new manufacturing firms per 1,000 employees in 1968 per annum.

(General Note: Adjustment is made here to the rate of entry to allow for the number of new manufacturing firm founders for each industrial order. This measure of the number of founders per 1,000 employees in an industry in 1968 was calculated, and was found when correlated with the above values to be very similar; $r_s = +0.94$; $t = 10.91$. For this reason the above entry rates are used in the following analyses.)

d. A higher rate of entry of new manufacturing firms is expected in those industries experiencing either the greatest degree of expansion or the least degree of contraction.

e. Industries in which small plants and firms are able to enter and survive will have the highest rates of entry of new manufacturing firms.

The findings of the examination of these five hypotheses are detailed in Table 4.3. (overpage). While all of the hypotheses are shown to have been correct in predicting the direction of the relationship, in only two cases are the relationships at all significant. The following outlines the thinking behind each of the above hypotheses.

The cost of establishing a new manufacturing firm is a vague notion. When do setting-up costs become running costs ? In this case data derived from a survey of 191 new manufacturing firms has been used, and the "cost" measure used covers that sum of money invested in the establishing of the firm at the outset. It does not therefore include any funds raised subsequently to finance the running of the firm, or additional funds necessary to "re-establish" the firm on a re-evaluation of its potential. The hypothesis here then relates purely to the ease of entry. If an industry is "cheap" to enter and one can use personal savings, then a priori, more new firms should be established in that industry. This assertion is in fact supported by the analysis where the high entry cost industries have low entry rates e.g. shipbuilding.

Table 4.3

Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Barriers-to-Entry

SIC	Entry Rates 1968-77	Cost of Entry (Median)	Plant Dominance (Employment)	Prop. Small Plants	Industry Expansion 1968-77	Size at Entry M1*	Size at Entry M2
3	14	3	9	9	1	1	2
4	11	4	5	2	10	17	17
5	13	8	7	13	4	16	16
6	17	2	6	14	11	13	5
7	9	10	8	7	17	6	6
8	6	5	3	5	2	15	10
9	7	8	4	12	5	14	15
10	16	1	2	8	13	10	6
11	15	11	1	3	8	8	10
12	2	12	12	4	12	11	10
13	10	7	14	17	15	5	3
14	3	5	17	6	13	7	4
15	8	17	15	16	3	3	1
16	5	13	13	15	16	2	8
17	4	16	16	1	6	11	9
18	11	14	11	11	7	4	10
19	1	15	10	10	8	9	10
Spearman's Rank Correlation Coefficients		-0.58	-0.54	+0.02	-0.24	-0.09	-0.01
't' values		2.602	2.504	0.80	0.97	0.36	0.05
Signif. Level	0.01	Yes	No	No	No	No	No
	0.05	Yes	Yes	No	No	No	No

* M1 = Mean size at entry or founding

M2 = Median size at entry or founding

The dominance of an industry by a few large plants tends to indicate that the minimum size for efficient production is a large unit, and would therefore tend to prohibit the entry of small, new firms. (PRATTEN, 1971; SILBERTSON, 1972; SHAW and SUTTON, 1976). Furthermore, it is suggested (and empirical evidence exists to support the notion) that large plants and firms tend not to employ people who subsequently want to set-up a new manufacturing firm. Large plants and firms are therefore seen as poor incubators for new manufacturing firm founders, and so areas dominated by them (and industries also) will have a reduced supply of new firm founders. Hence, entry rates in plant dominated industries would be expected to be relatively low compared to those industries made-up of large numbers of small firms. (see CROSS, 1981, 221; GUDGIN et al, 1979; STOREY, 1981). Both the hypotheses relating to plant dominance and the proportion of small plants gain support from the analyses, but neither do so with any strength.

It is perhaps surprising that there appears to be no relationship between the entry and survival of new manufacturing firms and the expansion of the industry entered. However, as was noted earlier (pp. 77-9), there was a large number of new firms entering declining industries. This can be partly explained by the fact that industries by and large supply themselves with their own stock of new firm founders. Hence, in a region dominated by declining industries, it is to be expected that the bulk of founders will only know how to enter their own industry. (CROSS, 1981, 235).

The final hypothesis suggested the size (numbers employed, if any) of new manufacturing firms at entry and the rate of entry into an industry would be related. Here it is assumed, in a similar fashion to the cost of entry, that the smaller a new manufacturing firm can be at entry, the easier and more likely that new firms will enter into industry. Negative relationships are indicated by the analysis which probably result from minimum size requirements at entry and the distorting influence of one or two large entrants.

2. Industrial Characteristics Hypotheses

Three main sub-hypotheses are proposed as being important here:

a. The rate of entry of new manufacturing firms and their survival is positively related to the age of an industry as measured by the year of opening of a plant. It is also expected that the age of employment in these plants is related to the rate of entry, but less strongly.

b. The rate of entry of new manufacturing firms and their survival is positively related to exit rates, especially the exit rates for small plants.

c. The rate of entry of new manufacturing firms and their survival is positively related to the level of Scottish ownership and control of an industry.

These three sub-hypotheses, the results of the examination of which are detailed in Table 4.4, lie between the ideas of entry impedence and the supply of new manufacturing firm founders. The key elements of the rationale behind each hypothesis is outlined below.

Table 4.4

Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Industrial Characteristics

SIC	Entry Rates 1968-77	Permanent Plants Age	Emp. Age	Exit Rates[a] 1968-77	Exit Rates[b] 1968-77	Owner Emp.[c] 1973	Scots. Plants[d] 1968
3	14	6	8	9	8	7	8
4	11	4	7	15	17	14	13
5	13	11	13	1	10	15	12
6	17	3	2	14	14	12	14
7	9	9	10	12	12	9	10
8	6	13	12	10	9	13	11
9	7	16	15	13	13	17	15
10	16	2	1	17	16	6	16
11	15	12	13	16	15	16	17
12	2	13	11	6	5	4	3
13	10	5	4	8	7	3	7
14	3	7	6	2	1	1	1
15	8	13	17	4	3	8	6
16	5	10	9	3	2	10	4
17	4	8	5	5	4	2	2
18	11	1	3	11	11	5	9
19	1	16	15	7	6	11	5
Spearman's Rank Correlation Coefficients		-0.47	+0.01	+0.59	+0.72	+0.31	+0.77
't' values		2.072	0.3892	2.8708	7.269	1.285	8.5469
Signif. Level	0.01	No	No	Yes	Yes	No	Yes
	0.05	Yes	No	Yes	Yes	No	Yes

[a] Total number of plants closing expressed as the number closing per 1,000 employees in the industry in 1968.
[b] Total number of plants closing which employed 100 or less employees at closure expressed as a number closing per 1,000 employees in the industry in 1968.
[c] Level of employment under Scottish ownership - ranked.
[d] Number of plants under Scottish ownership in 1968 expressed as a number per 1,000 employees in the industry in 1968.

The growth and dynamism of an industry can be gauged by the age of its membership i.e. the age of individual plants and firms. Those industries which are growing in terms of investment, though not necessarily employment, will be those with a low average age of industrial stock, and, ceteris paribus, will have a high entry and survival rate. The analysis supports this assertion, but in terms of employment a contrary relationship is indicated. The inverse relationship between entry and survival rates and the age of employment is mainly caused by the lag between employment generation and industrial investment. It is the investment made in manufacturing industry in previous production technologies which dominate the present employment/age profile of an industry which is itself dependent upon the age of the industry i.e. shipbuilding is an old industry along with the foundry industry, while electrical capital goods and motor vehiclesare relatively new industries.

Exit and entry rates are expected to be related because it is assumed that if it is easy to enter an industry, it is also probably just as easy to be forced out as well. This in fact turns out to be the case, especially in those industries with high exit rates amongst small plants.

Ownership is largely a surrogate measure which covers both the "small plants hypothesis" (it is small plants and firms which are the breeeding ground for more small plants and firms) and the "risk taking hypothesis" (person for person, there are more people involved in taking risky decisions in plants or

firms under Scottish ownership). Again, support is gained for these notions from the results presented in Table 4.4.

3. Factors of Supply Hypotheses

In an attempt to discern which features of each industry may influence the rate of entry and survival of new manufacturing firms, two related hypotheses have been used. They concern the mass and the nature of the mass of both plants (and firms) and employment in an industry, and their possible influence upon the rate of entry and survival. These two hypotheses are:

a. The greater the mass (number of plants and firms, or employment) in an industry, the greater will be the rate of entry and survival of new manufacturing firms.

b. An association exists between the nature (type) of the employment in an industry and the rate of entry and survival of new manufacturing firms. Three sub-divisions of this hypothesis can also be examined:

   i. The rate of entry and survival of new manufacturing firms is positively related to the level of administrative and managerial employment there is in an industry.

   ii. A positive association exists between the level of productive employment in an industry and the rate of entry and survival of new manufacturing firms.

   iii. The level of "other employment" (neither of the two above categories) will be inversely related to the rate of entry and survival of new manufacturing firms.

The results of the examination of these hypotheses is detailed in Table 4.5. (overpage).

Table 4.5

Rank Correlations for Hypotheses Relating to Industrial Variations in Entry Rates: Factors of Supply

SIC	Entry Rate 1968-77	No. of Plants[a] 1968	No. of Plants[b] 1968	No. Emp. 1968	Employment Type (permanent plants, 1977) Admin.	Oper.	Other
3	14.	1	7	2	13	11	3
4	11	17	13	16	3	17	1
5	13	10	10	9	2	16	2
6	17	11	14	6	10	8	7
7	9	3	11	1	4	12	11
8	6	14	12	15	5	7	14
9	7	12	15	5	1	15	12
10	16	13	17	7	15	2	17
11	15	14	16	8	8	14	4
12	2	4	4	10	11	6	9
13	10	2	8	3	16	4	13
14	3	16	1	16	14	3	16
15	8	8	6	10	17	1	15
16	5	7	2	13	12	5	10
17	4	6	3	12	7	9	8
18	11	5	9	4	6	13	5
19	1	9	5	14	9	10	6
Spearman's Rank Correlation Coefficients		+0.1054	+07267	-0.1348	+0.003	+0.24	-0.25
't' values		0.4967	4.0971	0.5269	0.013	0.97	1.08
Signif. Levels	0.01	No	Yes	No	No	No	No
	0.05	No	Yes	No	No	No	No

[a]Total number of plants in each industry ranked.

[b]Total number of plants in each industry expressed as a total per 1,000 employees in 1968.

By and large support is gained for each of the hypotheses, and in the case of the contrary relationship (contrary to that hypothesised) between the level of employment in an industry and the rate of entry can be explained by the "lag effect" again. High entry rates and a high level of employment in an industry are related, but the relationship is distorted by the small size of a number of youthful industries e.g. instrument engineering.

The key relationship under examination here is the supply of individuals able and willing to establish a new manufacturing firm and the actual emergence and survival of new manufacturing firms. A simple notion is first examined which states that there would be a relationship between the absolute numbers employed in an industry (assumption being that all people are able and willing to become a new manufacturing firm founder) and the entry and survival of new manufacturing firms. This crude relationship is then refined by splitting-up the total employment within an industry into three parts: administrative and managerial employees, operative employees, and other employees. Here, it is suggested, again drawing support from empirical data presented in the following chapter, that the propensity to become self-employed, or to set-up a new manufacturing firm is greatest amongst the managerial and professional "classes". The high agreement between entry rates and operative employment can be explained in part by the fact that high capital investment in an industry is inversely related with the level of operative employment, and is associated with large plants and firms. Hence, entry rates

are related to high labour intensity and low capital intensity of an industry.

4. SUMMARY AND CONCLUSIONS

This chapter has established the number of new and surviving manufacturing firms **entering** in each of the main industrial orders, and has examined the relationships (if any) between entry rates and industrial structure. Based on the analyses presented here it would appear that the following factors are associated with high entry rates at the national level for an industry:

a. low cost of entry
b. high proportion of small firms and plants
c. low proportion of large firms and plants
d. low average age of an industry
e. high exit rates
f. high level of Scottish ownership
g. high number of plants
h. high level of administrative and professional employees
i. high level of operative employment

The following chapter probes the supply of new manufacturing firm founders in an attempt to further analyse some of the above factors found in association with high entry rates at the industry level. These two sets of analyses contained in Chapters Four and Five are built-upon in a final analysis which examines the rate of entry at the local level using variables identified as being relevant and worthy of further investigation.

Chapter Five

INDUSTRIAL STRUCTURE AND THE SOURCE OF NEW FIRM FOUNDERS

The previous chapter contains analyses which indicate that there are a number of features of the local industrial structure which might be associated with the emergence of the new manufacturing firms. It is the purpose of this chapter to extend these analyses and to probe several features of an area's industrial structure in relation to the factors which might influence the supply of people willing and able to set-up new manufacturing firms.

Four specific aspects of the industrial structure are examined and these are: the structure of employment, the size of plants, the age of plants, and the ownership of plants. In each case the key question is whether or not **there is** any evidence to suggest that these factors might influence the supply of new firm founders. Comment is also passed on the geographic and sectoral sources of founders, and how together they might complicate statistical analyses relating industrial structure to the founding and survival of new manufacturing firms.

1. The Data

The data used in this chapter were gathered during 1978 from 191 new manufacturing firms which had traded as manufacturing firms in 1977 and had been set-up between 1968 and 1977. One of the main concerns when conducting the survey was to gain as large a response rate as possible and for this reason no sampling was

undertaken. In total, 518 new manufacturing firms were approached for information which was later reduced to 476 because 14 firms did not fall within the remit of the survey (they were not new firms or were not predominantly manufacturing), 15 firms had closed by 1978, in 3 cases the founder was not available and his (or her) whereabouts was not known, and in 10 cases the founder declined the invitation to be included in the survey. The 191 new manufacturing firms from which data were collected employed 38 per cent of employment in the new firms identified.

Data collection took place in three stages; two pilot surveys and one main survey. The three surveys were conducted between May and November 1978. The first stage was a pilot interview of new manufacturing firm founders in the Lothian Region. The purpose of this survey was both to collect data and to field test the questionnaire. In all 53 interviews were conducted. A second pilot survey was then undertaken by post in which 50 new manufacturing firm founders were contacted. In all 21 replied, 19 with usable information. Based on these two pilot surveys a final draft of the questionnaire was printed and sent to 419 new manufacturing firm founders of which 170 replied, 142 with usable information.

The data collected from each new manufacturing firm and its founder are as follows:

Movement of firm

Product made/service provided

Production method used

Male and female employment

Turnover

Training

Recruitment

Labour turnover

Markets

Suppliers

Management hierarchy

Research and development

Founder's education

Founder's family background

Founder's employment history

Knowledge of other new firms

Source of finance

Troubles in raising finance

Recruitment of initial labour

Choosing initial site

Other problems

Open question

The following analysis and comments draw mainly upon the data collected on the founders' employment history in an attempt to identify where they have been (in employment terms) and especially where they were employed immediately prior to setting-up a new manufacturing firm.

Table 5.1

First Employment Positions Held by Founders Setting-Up a New Manufacturing Firm in Scotland, 1968-77

First Employment Position	No. of Cases	
1. Managerial	48	31%
2. Skilled operative	11	7
3. Semi-skilled and unskilled operative	48	31
4. Other (Non-manufacturing)	47	30
Total	155	

Source: Survey

2. Previous Employment of Founders

From Table 5.1 and 5.2 it is evident that the bulk of people establishing new manufacturing firms in Scotland have moved from being employed on largely managerial and "Other" work to setting-up their own manufacturing firms. The "Other" work category is largely made-up of people from the Distributive Trades (SIC Order 23) and the Professional and Scientific Services (SIC Order 25). The latter group is mainly drawing people from education and medical services.

Taking both tables together it would appear that the origins (first employment position of founders) of founders and the position they held immediately prior to founding are disimilar, It is probably correct to suggest that those local areas with a greater proportion of their workforces engaged in managerial and professional occupations the greater would be the likelihood

Table 5.2

Employment Position Held by Founders Immediately Prior to Setting-Up a New Manufacturing Firm in Scotland, 1968-77

Previous Employment Position	No. of Cases	
1. Managerial	110	58%
2. Skilled operative	13	7
3. Semi-skilled and unskilled operative	8	4
4. Self-employed	9	5
5. Other (Non-manufacturing)	35	18
6. Not available	16	8
Total	191	

Source: Survey

of new manufacturing firms being established and surviving. It is therefore probably reasonable to include some measures of employment type in an area in any analysis examining the factors of new manufacturing firms.

3. Incubator Plant of Founders

A number of studies have suggested that the incubator plant (or organization) of a new manufacturing firm founder has a vital role in determining the number of new firms in an area, and the probable activities of those firms set-up. Cooper (1970) stresses the importance of the incubator plant in training and motivating the new firm founder, but at the same time it is important to remember that there are a wide range of other factors acting to shape the direction of any individual to one form of employment, or another. e.g. family and religious background, educational achievements, etc.

Table 5.3

Spin-Off Rates Categorised by the Size of Manufacturing "Incubator" Plants: A Comparison of Studies

Size of Incubator Plant	Regions of Study			
	Scotland	East Midlands	Northern Region	Palo Alto, California
1 - 25	7.4*	11.9	14.3	)
26 - 100	2.3	4.0	7.3	) 9.7
101 - 250	1.0	2.8	) 2.8	)
251+	1.0	1.0	)	)
500+			1.0	1.0
Sample Sizes	107	47	51	243

Sources: Scotland - this study; East Midlands - Gudgin et al (1979); Northern Region - Johnson and Cathcart (1979) using the following four size bands: 1-10, 11-99, 100-499, and 500+; Palo Alto - Cooper (1971) using two size bands: 1-500 and 501+.

*This spin-off rate indicates that there is a 7.4 times greater likelihood of finding a new manufacturing firm founder coming from a firm employing 25 or less people, than, say, one leaving a firm (or plant) employing over 250 people.

In this discussion attention is focused upon the immediately previous employer of the founder, and three characteristics of the incubator plants: their size, their age, and their status.

The empirical information detailed in Table 5.3, which draws on the present and others studies, indicates that it is much more likely to find a new firm founder leaving a small plant to set-up a manufacturing firm than a large plant. A number of explanations have been put forward to explain this situation and they include such factors as the training (employment experiences) gained whilst working for a small firm is more suited to teaching you how to set-up your own firm than are

the experiences gained while employed in a large plant. (GUDGIN et al, 1979; STOREY, 1981). Others argue that those employed in large and small firms represent groups of self-selected individuals and that those in small firms are probably better psychologically (and possibly sociologically) equipped to become self-employed in some form, and to set-up a new manufacturing firm, for example. (INGHAM, 1970). Such a suggestion would gain support from labour market theory which describes the splitting of the labour market into primary and secondary, and internal and external elements. Within these divisions are found both small (secondary, external) and large plants (primary, internal). (LOVERIDGE and MOK, 1978, 109). Though more recent evidence indicates that the differences between "large firm employees" and "small firm employees" should not be overstated, and that there are many other factors which should also be considered. (CURRAN and STANWORTH, 1981).

Irrespective of these explanations,

the propensity of employees of small firms and plants to set-up their own new manufacturing firm is many times greater than that of their large firm counterparts. In terms of the industrial structure of an area and its relationship with the emergence and survival of new firms, it would appear important to include some measure of the degree of employment concentration and so allow for the role of small plants as breeders of new firm founders.

Table 5.4

Age of "Incubator" Plants

Period in which Incubator Plant Opened	No. of Cases	
Pre 1900	24	23%
1901 - 45	9	10
Post 1945	73	68
Total	107	

Source: Survey

Two further characteristics of incubator plants considered here are their age and status. In his study of new, high technology firms in Palo Alto, Cooper (1970, 60) found that it was the new firms themselves which formed the best incubator plants. He suggested that it was the youthful and dynamic companies which were more likely to be spinning-off other new companies. The corollary of this statement is that those areas with large numbers of relatively old plants will have lower birth rates than those with relatively young (or youthful) plants.

In Table 5.4 data are presented which indicate that the bulk of new manufacturing firm founders employed in manufacturing industry left plants established since the war to set-up their own new manufacturing firms. On comparing the age distribution the incubator plants with the stock of all manufacturing plants it is found that there is no statistical difference between them. ($X^2 = 39.55$; $X^2 \alpha 0.01 = 23.21$; df = 10). A different

Table 5.5

Status of "Incubator" Plants

Status of Incubator Plants	No of Cases	
Scottish	59	55%
English	37	35
North American	10	9
Other World	1	1
Total	107	

Source: Survey

picture does emerge however if employment in each of the incubator plants is allocated to the year the plant opened. It is found that in general it is the employees in the more recently opened plants which are more likely to set-up their own new manufacturing firm.

In terms of ownership or status characteristics of the incubator plant it would appear from the available evidence that they act as incubators far more successfully than would have been at first thought. The crude distribution of the status of those incubator plants operating in manufacturing industy are detailed in Table 5.5. Even at this level of analysis there are less new manufacturing firms emerging and surviving from the ranks of Scottish owned sector of manufacturing industry given that nearly 70 per cent of manufacturing plants in Scotland are Scottish owned. When the analysis is extended to the calculation of surviving new manufacturing firms per thousand employees (in 1973, mid-point

for the study period) under the four ownership categories used in the table it is found the highest spin-off rate occurs from the Scottish owned sector (0.24 surviving new manufacturing firms per 1,000 employees), followed by the English owned (0.16), then American owned (0.11) and finally, plants owned by any other country (0.04). These rates would tend to confirm the finding noted in the previous chapter that it is the Scottish owned section of manufacturing industry, made-up of small manufacturing plants, which has the highest fertility rate in terms of "producing" more new manufacturing firms. At the local level then it would be expected that those areas with a higher proportion of Scottish owned plants, which will be, ceteris paribus, small, will have more new manufacturing firms than those areas dominated by externally owned plants.

4. Movement of Founders

a. Geographic Movement of Founders

It is generally supposed that the founding of a new manufacturing firm is a highly localised event and that the firm will initially be established in the place known best to the founder. Thus, it would not be expected to find founders moving on setting-up their new firm. In fact it could argued (see GUDGIN, 1974, 93-9; 1978, 106-7) that the survival of the new firm depends upon being established locally. Evidence from this study would allow the making of statements which agree this line of reasoning but with two major reservations.

Table 5.6

Geographic Source of Founders

Region	Local	Moved within Region to Local Area	Moved to Region from Elsewhere in Scotland	Moved to Region from Outside Scotland	Total
Borders	10	1	1	8	20
South West	4	-	-	5	9
Highlands & & Islands	9	-	4	18	31
Lothians	10	12	7	4	33
Grampians	8	5	2	5	20
Tayside	9	-	2	2	13
Central	3	-	1	1	5
Fife	7	-	1	6	14
Glasgow City	3	2	2	1	8
Outer Glasgow	3	3	8	9	23
Outer Strathclyde	2	1	8	4	15
Total	68 (37%)	24 (13%)	36 (19%)	63 (33%)	191

Source: Survey

First, the data presented in Table 5.6 indicates that the majority of new manufacturing firms were not established within the LOA in which the incubator plant was located. The bulk of the within region and between region movement can be accounted for by the existing home-work travel patterns of the founders. Prior to founding many founders commuted between Glasgow and Edinburgh, from the suburbs of Glasgow into the city centre, from Fife into Edinburgh, etc. Hence, when it came to founding a new firm founders chose (in the main) to locate the firm close to their home and often in the home itself. A further locational factor

pulling the new firm to a home centred location is that the wife (very few, only five, of the new firms were established by women) is also 50 per cent of the labourforce from the outset.

The second major geographic movement of founders can be divided into two main groups based on "motivations". One group is made-up of return migrants choosing to return to Scotland sometimes for family reasons. The second group, which is almost the preserve of the Highlands and Islands Region, comprises of those people seeking a new or alternative life-style. (CROSS, 1981a). These two groups account for around a third of all surviving new manufacturing firms established in Scotland during the study period. The firms established by the migrant group of founders differ only slightly from those established by non-migrant founders. Two differences emerge when comparisons are made between these two groups of founders. Migrant founders used more sources of finance than their non-migrant counterparts, and once established, the firms of the migrant founders tended to employ slightly more people than the firms of their non-migrant counterparts. (CROSS, 1981, 234).

One result of these findings is that analyses linking and seeking to establish the nature of the relationship between a local area's industrial structure and the number of surviving new manufacturing firms is severely restricted. The choice of the spatial units is therfore most important, and it is important to use the largest possible units exhibiting "containment" of the new firm formation process while at the same time allow meaningful

(meet the requirements of any statistical test used) analyses to be undertaken.

b. Sectoral Movement of Founders

Not all new manufacturing firm founders emerge from other manufacturing firms. There is a constant flow of founders across the sectors, and so at any one time there are a number of new manufacturing firms being set-up by founders leaving the service, or other sectors. Table 5.7 (overpage) captures the main sectoral sources of new manufacturing firm founders. At the more detailed level of individual orders there is a complex flow of founders between industrial and non-industrial orders. For example, "Other Metal Manufacturing" supplied or produced 12 new firm founders (of which it retained 7), but gained 26 new firms. The 5 new firm founders it lost were made good by gaining founders from "Metal Manufacturing", "Mechanical Engineering", "Electrical Engineering", "Shipbuilding", "Construction", "Transport and Communications", and finally, "Education". Similar imbalances in terms of gains and losses occurred in "Other Manufacturing", "Furniture", "Textiles" and "Food". In many ways, these are the "easier" industries to enter, and survive as a new firm.

For the analyses undertaken in the following chapter, the main indication given by the above observations is that the supply of new firm founders of manufacturing firms should not be restricted to a consideration of only manufacturing industry itself. The

Table 5.7

Sectoral Source of Founders

Sector	No of Cases	
Manufacturing	115	60%
Service	47	25
Not Known	29	15
Total	191	

Source: Survey

service sector must also be included in the analysis of the "supply side" of new firm formation. Furthermore, it is somewhat unreal ever to divide manufacturing and services into different sectors because of their close inter-connections.

5. Summary and Conclusions

This chapter has provided empirical support, using data obtained from new manufacturing firm founders, for the hypotheses examined in the previous chapter. It has been shown that the bulk of the founders of surviving new manufacturing firms in Scotland held managerial positions prior to founding. For those founders leaving manufacturing concerns prior to founding it has been shown that proportionally more left small plants (25 or less employees) which were Scottish owned and which had been set-up post-1945.

As regards using these findings to further investigate the possible links between an areas' manufacturing industrial base

and the number of new manufacturing firms being established, two possible limitations were indicated due to the geographic and sectoral movement of founders. However, it has been suggested that these two limitations can be accommodated, if not completely overcome, by the careful specification of the spatial units used and by the addition of a variable, measuring aspects of an area's service sector.

The following chapter builds upon this, and the previous chapter, to move from the association of single variables which influence the emergence of new manufacturing firms to a general assessment of the relative mix of influences acting together in the new firm formation process. Again, as has been the theme of this study, the analysis concentrates upon the "supply" side of the new firm formation process and does not therefore include measures for such factors as the availability of suitable premises, or regional variations in bank lending rates, or the number of local advisory bodies helping new and small firms, etc. These factors along with a more detailed consideration of the industries entered by the new firms studied here would best be undertaken in a separate study, and which would be largely concerned with the "demand" side of the new firm formation process.

Chapter Six

LOCAL INDUSTRIAL STRUCTURE, NEW MANUFACTURING FIRMS, AND THE SUPPLY OF FOUNDERS

At the outset of this study it was suggested that there was some relationship between the industrial structure of an area and the new manufacturing firms set-up in the area over a fixed period. One specific aspect of the new firm formation process has been concentrated upon in the attempt to examine the above relationship. The preceding chapters have lent support and in some cases shown that there would appear to be a definite relationship between an area and the number of surviving new manufacturing firms set-up. In Chapter Three, for example, the numbers and location of new manufacturing firms was described and a number of the characteristics of the areas where the greatest numbers were found were listed. Also in Chapter Three the contribution made by new manufacturing firms to regional development in terms of employment generation was also noted. By and large it was in the rural, suburban, and new town locations in which the greatest numbers of new manufacturing firms were found.

The following two chapters (4 and 5) attempted to present a number of indications of the likely factors which have shaped the noted distribution of surviving new manufacturing firms with specific reference to the supply of founders. These two chapters succeeded in providing positive indicators which

suggest that there are a number of characteristics of the industrial structure which appear to greatly enhance the likelihood of new manufacturing firms being formed and surviving. However, these analyses have been restricted to examining the association of a single independent variable with the number of new manufacturing firms formed in, say, an industry or section of the labour market. It is the aim of this chapter to extend these analyses by seeking to identify which "family" or "families" of factors account for the spatial variations identified in the numbers of new manufacturing firms at the local level.

The present chapter divides into five main parts, and all concern different aspects of the analysis undertaken. These five parts concern the scale, methods, hypotheses, variables, and the results of the analysis undertaken. The overall conclusions of these analyses are then detailed in a final section.

1. Hypotheses Under Investigation

A general hypothesis is putforward as being worthy of investigation which is then subdivided into five sub-groups along the lines developed earlier. (pages 80 - 91). The general hypothesis states that:

> The founding and survival of new manufacturing firms in an area is directly related to the industrial structure of the area. Hence, those areas with the greatest number of new surviving manufacturing firms are assumed as possessing an industrial structure which enhance the formation of such firms.

This general hypothesis can then be divided into a number of sub-hypotheses which suggest possible associations between specific aspects of the industrial structure of an area and the survival and founding of new manufacturing firms. From the analysis of Chapters Four and Five the following divisions are used: industrial mass; industrial structure; degree of change; employment type; and, plant characteristics. The hypotheses putforward under each of these divisions are as follows:

Industrial Mass - The greater the mass (number of plants and firms, or employment) in an area, the greater will be the rate of entry and survival of new manufacturing firms. (see page 88)

Degree of Change - A higher rate of entry and survival of new manufacturing firms will be found in those areas experiencing the greatest degree of growth or diversification. (see page 82)

Employment Type - The rate of entry and survival of new manufacturing firms will be greatest in those areas with large numbers employed in managerial occupations. (see pages 88 and 95)

Industrial Structure - The rate of entry and survival of new manufacturing firms in an area is directly related to the size distribution of plants (and their associated employment) in local industry. The entry and survival is negatively related to the degree of dominance of an area by a single or group of employers. (page 80)

Plant Characteristics - The rate of entry and survival of new manufacturing firms is related to the type of plants in an area in terms of their age and status. It is suggested that there is a positive relationship between the level of

> local control (Scottish ownership) and the youthfulness of the industrial stock and the emergence and survival of new manufacturing firms in an area.
> (pages 85 and 99)

It is these hypotheses which are used to determine the variables used in the analysis.

2. Scale of Analysis

It was noted earlier that the movement of founders on founding their firms might create problems for analysis, especially when it is suggested that there is a direct relationship between the numbers of new manufacturing firms and the industrial structure of an area. However, on probing this possible weakness in greater depth it is found that the degree of containment (i.e. the ability of an area to both contain the incubator plant and the initial location of the new firm) of different areal units is, perhaps surprisingly, very similar. The level of containment was calculated for three levels and resulted in the following levels of containment: Standard Regions - 52 per cent

Travel-to-work - 55 per cent

Local office areas - 46 per cent

Because of this high degree of similarity between the three spatial scales the most disaggregated level is used in the analysis presented here. However, in a number of cases some LOAs are excluded e.g. those areas with "no" new firms, or those with less than set levels of employees in manufacturing industry.

3. Methods of Analysis

The aim of the present analysis is (i) to derive a description by means of statistical techniques, if possible, of the type of industrial structure most likely "to produce" most new manufacturing firms, and (ii) to indicate the relative importance of individual aspects of an area's industrial structure in influencing the number of new manufacturing firms "produced". The simplest form of analysis is probably most appropriately undertaken using bivariate and multivariate statistical techniques. Simple correlation and regression techniques are therefore employed in the following analysis with the express aim of deriving a description of the nature of the relationship between the derived variables and the number of new manufacturing firms. (see BLALOCK, 1972a, 51-2; 1972b, 46 and 51; CROSS, 1981, 253-8).

4. Variables used in the Analysis

The following are the particular variables used in the findings reported here. (a full list of variables is in CROSS, 1981, 325-8).

a. Independent Variables

Variable Code	Description
MAN71	Manufacturing employment in 1971
TOTADM2	Total administrative employment in manufacturing industry in 1977 removing all such employment in those plants and firms opening during the period 1968-77

Variable Code	Description
TOTOP	Total operative employment in manufacturing industry in 1977 removing all such employment in those plants and firms opening during the period 1968-77
P500	Absolute total employment in manufacturing plants with 500 or more employees in 1977
DOMIND71	Employment in the largest employing industrial order in 1971
MANCHPC	Percentage change in manufacturing employment between 1971-76
SERPCCH	Percentage change in service employment between 1971-76
MLHCH	Absolute change in the number of minimum list headings in manufacturing industry between 1968-77 excluding any changes caused by the opening of new firms and plants during the same period
TURB	Total manufacturing employment lost in manufacturing industry expressed as the number of jobs lost per 1,000 employees in manufacturing industry in 1971
SCOTH1PC	Total manufacturing employment in operative positions in Scottish owned manufacturing plants opening prior to 1968 as a percentage of total operative employment
SCOTH2PC	Total manufacturing employment in operative positions in Scottish owned independent manufacturing plants (completely independent plants and plants with headquarters at the site) open prior to 1968
SCOTAPC	Total administrative employment in Scottish owned manufacturing plants open to 1968 as a percentage of total manufacturing employment

Variable Code	Description
SCOTA2PC	Total administrative employment in independent Scottish owned manufacturing plants (completely independent plants and plants with headquarters at the site) as a percentage of total manufacturing employment in 1968 excluding all such employment in plants and firms opening in the 1968-77 period
SCOTHX1	Total other manufacturing employment in Scottish owned manufacturing plants open prior to 1968 as a percentage of total manufacturing employment
EMPIND1	Total manufacturing employment in 1971 as a percentage of total employment in 1971
P500PC	Total manufacturing employment in plants employing 500 or more employees as a percentage of total employment in 1968
PLE100	Total number of Scottish owned manufacturing plants with 100 or less employees and open prior to 1968
AGE2	Mean age of manufacturing plants open prior to 1968
SUBSID	Number of subsidiary manufacturing plants open prior to 1968

b. Dependent Variable

Only one dependent variable is used but three measures were derived to express the number of surviving new manufacturing firms identified in an LOA.

BIRTH1

$$\frac{\text{Number of Surviving New Manufacturing Firms}}{\text{Numbers employed in Manufacturing Industry in 1971}} \times 1{,}000$$

Variable Code	Description
BIRTH2	Number of New and Surviving Manufacturing Firms / Number of Administrative Employees in Manufacturing Plants open prior to 1968 X 1,000
BIRTH3	Number of New and Surving Manufacturing Firms / Numbers Employed in both Manufacturing and Service Industries in 1971 X 1,000

5. The Analysis and its Findings

The broad structure of the analysis follows those lines suggested by Blalock (1972a, 187-8), and initially correlation coefficients are derived between all the dependent and indpendent variables using untransformed data.

(see CROSS, 1981, 325-8 for a full list of variables used.) Further to using each of the three measures of the dependent variable a number of LOAs were systematically excluded on the basis of the number employed in manufacturing industry in 1971. In all, five lower limits were used and these were: 0; 999; 1,999; 2,999; and 3,999. By and large this process served to exclude small, rural LOAs. One effect of this procedure was to increase the correlation coefficients to a maximum at the 2,999 level, after which they declined. This suggests that it is those LOAs with a minimum level of manufacturing employment of around 3,000 which gave

the higher correlation coefficients. The exclusion of the smaller manufacturing concentrations is not inconsistent with the hypotheses under investigation and in part points to the difficulty of explaining the emergence of new manufacturing firms in very small rural areas by the method adopted here. (see CROSS, 1981a). It is also important to note that the exclusion of many of these areas also means excluding those areas receiving many of their founders from outside Scotland. (see page 102). The final criterion used the 2,999 cut-off limit and meant the exclusion of 41 LOAs.

Further reductions are necessary if the findings of the analysis are to be interpreted with any clarity. Of the three dependent variable measures described above, BIRTH3 is used here. Some of the initial correlation coefficients are presented in Table 6.1. Only selected variables of the 79 derived are listed for reasons of clarity of presentation and these represent those yielding the highest coefficients.

When the correlation coefficients presented in the table are combined with those derived for LOAs excluded on an employment size basis (noted on the previous page), there emerges an overall stability for both the size and direction of the associations between the dependent and independent variables. One exception to this situation occurs with the independent variable, EMPIND71 which changes the direction of its association from being weakly negative to being weakly positive. This situation arises because of the exclusion of the small LOAs which have a small

Table 6.1

Correlations Between the Local Industrial Environment and the Number of New Manufacturing Firms

Aspects of the Local Industrial Environment (Independent Variables)		Correlation Coefficients All LOAs (n = 121)	
Industrial Mass	MAN71	- 0.2280	0.006*
	P500	- 0.2161	0.009
	TOTADM2	- 0.2032	0.013
	TOTOP	- 0.2060	0.012
Industrial Structure	DOMIND71	- 0.2578	0.002
Degree of Change	MANCHPC	+ 0.3551	0.001
	SERPCCH	+ 0.1359	0.069
	MLHCH	+ 0.5558	0.001
	TURB	+ 0.0674	0.231
Employment Type	SCOTAPC	+ 0.3099	0.001
	SCOTA2PC	+ 0.2529	0.003
	SCOTHX1	+ 0.2662	0.002
	SCOTH1PC	+ 0.2147	0.009
	SCOTH2PC	+ 0.2051	0.012
	EMPIND1	- 0.2213	0.007
Plant Characteristics	P500PC	- 0.2552	0.002
	PLE100	+ 0.2020	0.0764
	SUBSID	+ 0.2029	0.013
	AGE2	+ 0.0274	0.383

*Level of significance

manufacturing base and in which manufacturing industry was only a minor provider of employment at the begining of the study period e.g. 9 per cent in Inverness and 7 per cent in Oban. The existence of such low values in Inverness and Oban are sufficient to influence the correlation coefficent and to produce a negative association. For the variables SERPCCH, PLE100 and AGE2 the exclusion of the smallest LOAs leadsto a marked increase in the size of their correlation coefficients.

In terms of the hypotheses under investigation, the direction of the correlation coefficients are all in the direction suggested. However, a negative relationship between the absolute size of the industrial base (or facets of it) and the number of new manufacturing firms was not explicitly stated, but it is explicable with the available data. In Chapter Three it was shown that it was not the traditional centres which were gaining new manufacturing firms (and plants) throughout the 1968-77 period. In fact, it was the traditional areas which were in decline, but they were still, in absolute employment terms, larger than most of the other LOAs. It was shown in Chapter Five that it was these traditional centres of industry which "supplied" the founders for the new manufacturing firms set-up in their surrounding areas (page 102; also see CROSS, 1981, 228-32 and 250-3). A further reason accounting for this negative relationship relates to the measure of "new firms" used in this study. This study represents an examination of successful new manufacturing firms, in common with many other studies, and is therefore concerned with the relationships between an area's industrial structure and the number of surviving new manufacturing firms. On the basis of the evidence presented thus far it would appear that the inner city area is not the incubator for new manufacturing firms. (see KEEBLE, 1976, 28-9; FOTHERGILL and GUDGIN, 1978; CAMERON, 1980).

At first sight, an LOA with more than 3,000 manufacturing employees with a diverse range of plants by size and industry, and which is experiencing employment growth is the most likely

location for new manufacturing firms. Other aspects of an LOA's industrial base with an influence upon the number of new manufacturing firms located there would also appear to include the following: the level of independent Scottish plants and the age of the plants. However, these must remain very tentative observations for the time being as much more empirical work is required to extend our understanding of the labour market and flows of people from paid to self-employment.

All 19 variables listed in Table 6.1 were correlated with each other using both the full (121) and the reduced numbers of LOAs (89, 72, 56 and 48). As would be expected the size of the correlation coefficients is higher in those parts of the matrix covering common measures. There are also parts within both matrices where other high correlation coefficients occur e.g. DOMIND71, P500PC, PLE100, and SUBSID. In terms of aiding the present analysis in terms of the selection and inclusion of the independent variables for a regression analysis, a pairwise correlation coefficient between independent variables was set. Previous work is of immediate assistance on this topic, and the levels set elsewhere vary from 0.8 (KEEBLE, 1976, 90) to 0.85 (KEEBLE and HAUSER, 1972, 13), or fluctuate between 0.85 and 1.0 (KIM and KAHOUT, 1975, 340). The level set for this study is 0.707 which accounts for 50 per cent of the variation between the two independent variables correlated. Adoption of this level would exclude, for example, the use of DOMIND71 with MAN71, P500, TOTADM2 or TOTOP. Collinearity does not therefore cause an insurmountable problems for the present analysis.

A number of problems arise from the use of LOAs in which no surviving new manufacturing firms were identified. If these areas are excluded from the analysis the size of the correlation coefficients is further increased. Several areas cause distortions simply because of their absolute size (in terms of employment) or because of their "lack" (very small number of surviving new manufacturing firms identified) of new firms, and these areas are: Aberdeen, Bridgeton, Dundee, Edinburgh, Grangemouth, Greenock, Paisley, Parkhead, and Partick. Exclusion of these areas would reduce the number of LOAs used in the analysis to only 66, and the remaining ones are those which encircle the traditional industrial areas, and are experiencing employment growth.

Subsequent analyses entailed the examination of the joint distribution of each independent variable with the dependent one. Without exception, each distribution (graphical) revealed that non-linear relationships existed, or at least appeared to do so. With the exclusion of LOAs on the basis of the criterion outlined above no improvement in terms of the correlation coefficients followed. Subsequent analyses involved the transformation of the dependent and independent variables to reduce the amount of scatter about the least squares equation. In some instances the size of the correlation coefficient was increased, but of paramount importance here is the slope. Of perhaps even greater importance still are the beta weights or standardised partial regression coefficients which indicate the relative changes in variables on a standard scale.

Table 6.2

Regression between Number of New Manufacturing Firms with Selected Independent Variables

Dependent Variables = BIRTH3 = Number of new manufacturing firms per 1,000 people employed in both service and manufacturing in 1971

Independent Variables	b	Beta	SE_b	F-value	df.
SERPCCH	0.99448	0.41092	0.00245	16.531	1,77
AGE2	0.43197	0.13431	0.00351	1.519	2,76
MAN71	- 0.1331	-0.18571	0.00001	2.968	3,75

Constant = - 8.01548

SE_{est} = 0.50919

R^2 = 0.25468

R^2 (adj.) = 0.22487

After this initial sorting of the independent variables, three emerged to be of greater importance in the new manufacturing firm formation process, and these are: SERPCCH, AGE2 and MAN71. The combination of these variables resulted in a disappointing, but expected low level of variation explained (R^2) of 0.25. (Table 6.2). The contribution made by each variable is in the direction expected but the nature of the slope was nearly parallel to the axes of the independent variables. This indicates that irrespective of the increase in the independent variables little or no change occurred in the dependent variable. This prompted further analyses and two further sets of areas were excluded from the analysis. First, all areas where zero was recorded in all but the change variable were excluded. This

procedure reduced the 79 LOAs previously used to 66 and this was still further reduced by excluding all LOAs in which no new manufacturing firms were identified. Using this second criterion produced 51 LOAs. The remaining 51 LOAs included all of the major industrial areas both experiencing growth and decline and were used in further analyses. Several other areas were also excluded based on the growth of either manufacturing or service employment. (see CROSS, 1981, 273). Even when these means were adopted to help increase the level of variation explained no material gains were acheived.

6. Summary and Conclusions

The aim of this chapter was to extend the associations and relationships probed in earlier chapters between single independent variables and the number of surviving new manufacturing firms on a "group" basis. By extending the earlier lines of analysis an attempt has been made to identify which mix of factors are most likely to be associated with the emergence and survival of new manufacturing firms at the local level. To a limited degree the chapter has gone some way to acheiving these aims but it has failed to develop a close statistical description of the hypothesised relationships. A number of reasons have been putforward in the text to account for this lack of success not least of which is the fact that the formation of new manufacturing firms is not a process which is completely dependent upon local factors.

Table 6.3

Local Factors Influencing the Supply of New Manufacturing Firms

Local Factors	
Enhancing Supply	Impeding Supply
Manufacturing Employment Growth (prior to founding)	Degree of Plant Dominance
Industrial Specialisation (but not dominated by any one industry)	Absolute Size of Manufacturing Employment Base (prior to founding)
Service Employment Growth	Absolute Size of Employment in Main Industry
Youth of Industrial Stock	Level of Operative Employment
Increased Industrial Activity	
Number of Small Plants and their Importance as Employers	
Level of Administrative Employment	

From the correlations undertaken and from the few which are presented in this chapter it is possible to suggest with reasonable empirical support a number of factors which are most likely to be found in association with, and possibly influencing the number of new manufacturing firms in an area. In addition to drawing upon the relationships suggested by the analyses presented in this chapter, the findings of previous chapters can be used to construct a list of factors enhancing and impeding the supply of new manufacturing firms at the local level. The beginings of such a list is detailed in Table 6.3.

The undoubted conclusion to be drawn from all of the preceeding analyses is that there is a relationship between the industrial structure of an area and the number of surviving new manufacturing firms founded there. At the same time it is equally clear that the industrial structure of a local area is but one factor in the new firm formation process. Other lines of enquiry immediately suggest themselves as being worthy of investigation such as a detailed examination of other local supply factors e.g. availability of premises (JURUE, 1980), of machinery (especially second-hand), etc. More is needed to be known of the transfer of firms between industries on founding e.g. move from retail to repair to manufacture, and on the move of the new firm from being a supplier of manufacturing services to one of being a producer of manufactured goods. At the moment the state of the art as regards new manufacturing firms is still in its infancy.

Chapter Seven

IMPLICATIONS AND CONCLUSIONS

1. Introduction

In the course of the study presented here it has been shown that the founding of new manufacturing firms in Scotland has provided an important, but minor share of new manufacturing employment. New manufacturing firms exhibited faster employment growth rates than their new branch and subsidiary plant counterparts. The factors influencing the initial location of new manufacturing firms has been shown to depend on a wide range of factors ranging from the personal characteristics of the founders themselves to various features of the local industrial environment. From the mass detail generated in the course of this study, what general messages emerge ? What messages emerge as regards, say, regional development ? The aim of this chapter is to collect together these general messages under three broad headings: regional development, industrial location theory, and research methodology.

2. Regional Development

The future development and continuance of Scotland as a major centre of manufacturing industry depends upon a complex series of economic, political, and social factors. Much of the future economic development of Scotland will be shaped by the ability of its manufacturing industrial base to adapt to changing trading conditions. Part of this adaptation process will,

ceteris paribus, be reflected in the emergence and development of new manufacturing firms. Other parts of the adaptation process will occur by existing firms investing on existing, or new sites to exploit new ideas, enter new markets, and in turn "pull" Scottish manufacturing industry from being based on the traditional industries (shipbuilding, iron and steel, etc.) to one of being based on the new and expanding industries. What evidence is there that new manufacturing firms are contributing to this process of regional development and change in Scotland ?

From the data gathered in the course of this study it would appear that surviving new manufacturing firms have made little significant contribution to the long-term development of manufacturing industry in Scotland. Then, it must be remembered that regional development is a longrun process and not one which can be contained, and hence considered by taking a single ten year period. The contribution of new manufacturing firms to regional development it is being suggested is cumulative and will only become apparent over, say, a thirty year period. (see GUDGIN, 1978).

Despite the lack of any data over a long time period it is not possible to place the present study period in any historic context. It would appear that a number of other changes which have occurred during the study period, and reflect the continuation of well established patterns, would appear to be acting to impede the emergence and development of new manufacturing firms. The most noticeable change within manufacturing industry is the

continuing build-up of foreign owned plants in Scotland by the opening of new plants, the merger and take-over of Scottish owned plants, and the different rates of employment loss between Scottish and Non-Scottish owned plants. Such a trend based on the evidence and thesis presented in this study suggest that it would act to impede the emergence of new firm founders from labour markets in Scotland. Furthermore, it could be suggested that with the decline of manufacturing industry both in Scotland, and in the U.K. in general, tomorrows' new firms are more likely to emerge in the service sector. Evidence is yet to be produced either to confirm, or refute such a suggestion.

The industries entered by the new manufacturing firms identified by this study would not suggest that they are entering new and expanding industries (in terms of employment). They are not therefore at the national level acting to diversify the economy but at the local level this is not necessarily the case. This is because of the varying size of the industrial centres throughout Scotland. Plus, it has been shown, in common with other studies, the source of new firms is not restricted to areas previously regarded as being the "seed bed" for new firms. And so, in part, the emergence and survival of new manufacturing firms in the smaller rural areas were acting not so much to diversify an existing economy, but more to its development.

3. Industrial Location Theory

It would be a mistake to think that any single study could offer either an alternative theory of industrial location, or of new firm formation, but the present study does offer some insights into both theories.

Implicit within the framework adopted for the present study is the existence of spatial selection of firms leading to consistent variations in firms across space. (see McDERMOTT, 1977, 347-52). It is these variations in firms which help to account for the intra- and inter-regional disparities in the number of new manufacturing firms. While largely non-comparable evidence was offered to illustrate the existence of inter-regional differences in the relative importance of new manufacturing firms, there does undoubtedly exist a difference in their relative importance and these differences might reflect different local conditions. In some areas local conditions would appear to actively encourage the formation of new manufacturing firms while in others the local conditions appear almost hostile to the formation of new manufacturing firms. This study has indicated a number of factors which are "favourable" and "hostile" to the supply of new firm founders at the intra-regional level, and might also account for some of the inter-regional differences.

Perhaps the most important empirical finding of the study is link between supply of new firm founders and the subsequent emergence of new manufacturing firms is migration. At the

heart of each new firm lies its founder who perceived that an opportunity existed, who believed that he could survive economically by being "self-employed", and who sought the necessary resources to make the new firm project a reality. It is therefore suggested that while there are restraints on the move between paid and self-employment and that many people will be frustrated and fail to progress beyond "dreaming" about self-employment, the key determinant in the flow of new manufacturing firms to the stock of manufacturing firms is people. An understanding and explanation of the new firm formation process can not be gained by reference to barriers-to-entry arguments, the key to the process is an understanding of the size, nature, and content of local labour markets. Hence, for industrial geography, or any other branch of geography, to further the explanation of events throughout space a broader appraoch is needed. In the case of new manufacturing firms excursions are necessary in to sociology (social mobility theories), psychology (motivation theories), and labour economics (labour market segmentation theories). This study has demonstrated that to combine some of the empirical observations with the observed spatial patterns is not possible within the present strictures of industrial geography as regards new manufacturing firms. Hopefully, this study has indicated a number of avenues which would be worthy of further investigation.

4. Research Methodology

Three aspects of the methodology are worthy of recall here. First, where the existence of a consistent single data base does not exist, the combination of several data bases can allow with caution components of manufacturing employment change analysis to be performed. Second, the sources of data suitable for such an excercise are far greater than is often suggested. Large sources of data are still unused and could be introduced into future studies of industrial change e.g. user registers to the major nationalised utilities. Third, the importance of scale linkage has been demonstrated in explaining industrial change from the local to the national levels.

This study set out with aim of establishing the numbers and location of new manufacturing firms in Scotland over a ten year period, and sought to measure the relative employment contributions they made across space. The bulk of the study then set itself the task of accounting for these differences throughout space with specific reference to the features of local areas and concentrated upon the supply of new manufacturing firm founders. The success of the study in general varies, but it is suggested that benefits and gains have emerged from the approach adopted and that a contribution has been made, and one of relevance, to the main-stream of industrial geography where it has its roots.

BIBLIOGRAPHY

Ackoff, R. L. with Gupta, S.K. and Minas, J.S. (1962)"Scientific Method: Optimising Applied Research Decisions." New York

Alden, J. (1971) Double Job-Holding: A Regional Analysis of Scotland, "Scottish Jo. of Pol. Econ.", 18, 2, 99-112

Allen, K. and Yuill, D. (1977) The Accuracy of Pre-1971 Local Employment Data (ERIIs), "Regional Studies", 11, 4, 253-61

Allen, K. and Yuill, D. (1978) "Small Area Employment Forecasting. Data and Problems." Saxon House, Farnborough

Ashcroft, B. and Taylor, J. (1976) "The Movement of Manufacturing Industry and the Effect of Regional Policy." Occ. Paper, Dept. of Economics, University of Lancaster

Ashcroft, B. and Taylor, J. (1979) The Effect of Regional Policy on the Movement of Industry in Great Britain, Chapter 2, 43-64, in MacLennan, D. and Parr, J.B. (eds.) op. cit.

Bakke, E.W. (ed. 1964) "Labour Mobility and Economic Opportunity." New York

Bannock, G. and Doran, A. (1978) "Small Firms in Cities. A Review of Recent Research." Shell (UK) Ltd., London

Baumol, W.J. (1968) Entrepreneurship in Economic History, "American Economic Review", 58, 2, 64-71

Beed, C.S. (1966) The Separation of Ownership from Control, "Jo. of Economic Studies", 1, 2, 29-46

Beesley, M.E. (1955) The Birth and Death of Industrial Establishments: The Experience in the West Midlands Conurbation, "Jo. of Industrial Economics", 4, 45-61

Berle, A.A. and Means, G. (1932) "The Modern Corporation and Private Property." MacMillan, London

Bernstein, H. (1971) Modernization Theory and the Sociological Study of Development, "Jo. of Development Studies", 7, 2, 141-60

Blalock, H.M. Jr. (1963) Correlated Independent Variables: The Problem of Multicollinearity, "Social Forces", 42, 233-7

Blalock, H.M. (1972) "Social Statistics." McGraw-Hill Kogakusha, New York 2nd Edition

Blalock, H.M. Jr. (1972) "Causal Inferences in Nonexperimental Research." W.W. Norton and Co., New York

Bright, J.R. (1958) "Automation and Management." Harvard Business School, Division of Research, Boston

Buswell, R.J. and Lewis, E.W. (1970) The Geographical Distribution of Industrial Research Activity in the U.K., "Regional Studies", 4, 297-306

Buxton, N.K. and Mackay, D.I. (assisted by C.L. Wood)(1977) "British Employment Statistics. A Guide to Sources and Methods." Blackwell, Oxford

Cameron, G.C. (1973) Intra-Urban Location and the New Plant, "Papers and Proceedings, Regional Science Association", 31,125-44

- " - (1977) Economic Renewal in the Inner City, "Architects Jo.", 165, 215-7

- " - (1979) The National Industrial Strategy and Regional Policy, Chapter 14, 297-322 in MacLennan, D. and Parr, J.B. (eds.) op. cit.

- " - (1980) The Inner City: New Plant Incubator ?, Chapter 15, 351-66 in Evans, A. and Eversley, D. (eds.) op. cit.

Cameron, G.C. and Clark, B.D. (1966) "Industrial Movement and the Regional Problem." Occ. Paper No. 5, Social and Economic Studies, University of Glasgow and Oliver and Boyd, Edinburgh

Cameron, I. (1979) "Components of Employment Change in Portsmouth TWA (1966-76)" Research and Intelligence Group, Planning Dept., Hampshire CC.

Carter, C.J. (1974) Some Post-War Changes in the Industrial Geography of the Clydeside Conurbation, "Scottish Geographical Magazine", 90, 1, 14-26

Carter, I.R. (1974) The Highlands of Scotland as an Underdeveloped Region, 279-311 in de Kadt, E. and Williams, G. (eds.) op. cit.

Castells, M. and de Ipola, E. (1976) Epistemological Practice and the Social Sciences, "Economy and Science", 5, 111-44

Chapman, G.P. (1977)"Human and Environmental Systems: A Geographer's Appraisal." Academic Press, London & New York

Chinitz, B. (1961) Contrasts in Agglomeration: New York and Pittsburgh, "American Economic Review", 51, 279-89

Chisholm, M. (1960) The Geography of Commuting, "Annals, American Association of Geographers", 50, 187 & 491-2

- " - (1970) On the Making of a Myth ? How Capital Intensive is Industry in the Development Areas ? "Urban Studies", 7, 289-293

- " - (1976) Regional Policies in an Era of Slow Population Growth and Higher Unemployment, "Regional Studies", 10, 2, 201-13

Churchman, C.W. (1954) The Philosophy of Experimentation, Chapter 12, 159-72 in Kempthorne, O. et al (eds.) op. cit.

Collins, L. (1966) "Industrial Migration and Relocation: A Study of European Branch Plants in Metropolitan Toronto." Unpublished M.A. Dissertation, University of Toronto

- " - (1972) "Industrial Migration in Ontario: Forecasting Aspects of Industrial Activity through Markov Chain Analysis." Statistics Canada, Ottawa

Coombes, M.G. et al (1978) Towards a More Rational Consideration of Census Areal Units: Daily Urban Systems in Britain, "Environment and Planning", A, 10, 10, 1179-85

Cooper, A.C. (1970) The Palo Alto Experience, "Industrial Research", May, 58-60

- " - (1971) Spin-Offs and Technical Entrepreneurship, "IEEE Transactions on Engineering Management", EM-18,1, 2-6

Cross, M. (1980) "The Closure and Redundancy Records of the Department of Employment." Typescript, Durham University Business School

- " - (1981) "New Firm Formation and Regional Development." Gower, Farnborough, Hants.

- " - (1981a) "The Components of Employment Change - Rural Growth and Urban Decline." Paper presented to the XIth European Congress for Rural Sociology, Helsinki

Curran. J, and Stanworth, J. (1981) The Social Dynamics of the Small Manufacturing Enterprise, "Jo. of Management Studies", 18, 2, 141 - 158

Davidson, R.N. (1967) "Aspects of the Distribution of Employment in Glasgow: A Locational Analysis of Employee/Area Relationship." Unpublished Ph.D. Dissertation, University of Glasgow. 3 Vols.

Davies, S. (1979) "The Diffusion of Process Innovations." Cambridge University Press, Cambridge

Dennis, R. (1978) The Decline of Manufacturing Employment in Greater London: 1966 - 1974, "Urban Studies", 15, 1, 63 - 73

Department of Employment (1978) "Annual Census of Employment - Limitations on the Use of Data for Individual Census Units." Prepared for the National and Local Government Statistical Liaison Committee (NLGSC) Ref: NLGSC (78) 26

- " - (no date) "Employment in Metropolitan Areas." Project Report by the Unit for Manpower Studies, Department of Employment, London

Department of Trade and Industry (1973) "Memorandum on the Inquiry into Location and Experience." Minutes of Evidence, Trade and Industry Sub-Committee of the House of Commons Expenditure Committee. HMSO, London.

Dicken, P. and Lloyd, P.E. (1976) Geographical Perspectives on United States Investment in the United Kingdom, "Environment and Planning", A, 8, 685 - 705

- " - (1978) Inner Metropolitan Industrial Change, Enterprise Structures and Policy Issues: Case Studies of Manchester and Merseyside, "Regional Studies", 12, 2, 181-97

Dray, W.H. (1964) "Philosophy of History." Prentice-Hall, Englewood Cliffs, New Jersey

Duncan, O.D. et al (1961) "Statistical Geography: Problems in Analysing Areal Data." Free Press, New York

Erickson, R.A. (1978) The New Wave of Nonmetropolitan Industrialization, "Earth and Mineral Sciences", 48, 3, 17-20

Evans, A.W. (1973) The Location of the Headquarters of Industrial Companies, "Urban Studies", 10, 3, 387-95

Evans, A.W. and Eversley, D. (eds. 1980) "The Inner City. Employment and Industry." Heinemann, London

E.E.C. (Directorate General Regional Policy) (1975) "Feasibility Study on Investment from Other Countries in the Least Prosperous Regions of the Community." EEC, Brussels 2 Vols

Fagg, J.J. (1979) "A Re-Examination of the Incubator Hypothesis: A Case Study of the Location of New Manufacturing Firms in Greater Leicester, 1957-70." Paper presented at the Annual Conference of the IBG, University of Manchester

Firn, J.R. (1970) "The Glasgow University Register of Industrial Establishments." Metropolitan Industrial Location Working Paper 1.7, Dept. of Social and Economic Studies, University of Glasgow

- " - (1973) Indigenous Growth and Regional Development: The Experience and Prospects for West Central Scotland, 47-72 in "West Central Scotland: Appraisal of Economic Options." Disc. Paper No. 12, Dept. of Social and Economic Research, University of Glasgow

- " - (1975) External Control and Regional Development: The Case of Scotland, "Environment and Planning", 7, 4, 393-414

- " - (1976) Economic Microdata Analysis and Urban-Regional Change: The Experience of GURIE in Swales, J.K. (ed.) op. cit.

- " - (1977) Industrial Policy, Chapter 4, 62-83 in Mackay, D.I. (ed.) op. cit.

Firn, J.R. and Hughes, J.T. (1974) Employment Growth and the Decentalization of Manufacturing Industry: Some Intriguing Paradoxes, 483-518 in "Papers from the Urban Economics Conference, 1973." Centre for Environmental Studies, London

Firn, J.R. and Swales, J.K. (1978) The Formation of New Manufacturing Establishments in the Central Clydeside and West Midlands Conurbations 1963-1972: A Comparative Analysis, "Regional Studies", 12, 2, 199-213

Forsyth, D. (1972) "US Investment in Scotland." Praeger, New York

Fothergill, S. and Gudgin, G. (1978a) "The Structural Growth and Decline of the UK Regions in its International Context." CES-WN-495, Centre for Environmental Studies, London

- " - (1978b) "Regional Employment Change: A Sub-Regional Explanation ?" CES-WN-488, Centre for Environmental Studies, London

- " - (1982) "Unequal Growth: Employment Change in British Cities and Regions." Heinemann, London

Frank, A.G. (1969) "Capitalism and Underdevelopment in Latin America: Historical Studies of Chile and Brazil." Modern Paperbacks Edition, New York

Galtung, J. (1971) A Structural Theory of Imperialism, "Jo. of Peace Research", 2, 2, 81-117

Ganguly, A. (1982a) Births and Deaths of Firms in the UK in 1980, "British Business", 29 Jan., 204-7

- " - (1982b) Regional Distribution of Births and Deaths of Firms in the UK in 1980, "British Business", 2 April, 648-50

- " - (1982c) Births and Deaths of Firms in the UK in 1981, "British Business", 23 July, 512-3

Ghodgeri, N. (1974) "Manufacturing Industry in Post-War Edinburgh with Special Reference to the Post 1960 Period." Unpublished M.Phil. Dissertation, University of Edinburgh

Gilbert, A. and Goodman, D. (1972) "Regional Income Disparaties and Economic Development: A Critique." Occ. Paper No. 2, Institute of Latin American Studies, University of London

Goddard, J.B. and Smith, I.J. (1978) Changes in Corporate Control in the British Urban System, 1972-1977, "Environment and Planning", A, 10, 9, 1073-84

Goodman, J.F.B. (1970) The Definition and Analysis of Local Labour Markets: Some Empirical Problems, "British Jo. of Industrial Relations", 8, 179-95

Green, D.H. (1977) Industrialists Information Levels of Regional Incentives, "Regional Studies", 11, 1, 7-18

Gregory, D. (1978) "Ideology, Science and Human Geography." Hutchinson, London

Gripaios, P. (1977a) The Closure of Firms in the Inner City: The South East London Case 1970-75, "Regional Studies", 11, 1, 1-6

- " - (1977b) Industrial Decline in London: An Examination of its Causes, "Urban Studies", 14, 2, 181-9

Gudgin, G. (1974) "Industrial Location Processes. The East Midlands in the Postwar Period." Unpublished Ph.D. Dissertation, University of Leicester

- " - (1978) "Industrial Location Processes and Regional Employment Growth." Saxon House, Farnborough, Hants.

Gudgin, G. et al (1979) "New Manufacturing Firms in Regional Employment Growth." Paper presented at CES Workshop, Centre for Environmental Studies, London

Haggett, P. (1965) "Locational Analysis in Human Geography." Edward Arnold, London

Hall, P. (1974) The Containment of Urban England, "Geographical Jo.", 140, 386-417

Hall, P. et al (1973) "Megalopolis Denied: The Containment of Urban England, 1945-70." Allen and Unwin, London

Henderson, R.A. (1974) Industrial Overspill from Glasgow, 1958-1968, "Urban Studies", 11, 1, 61-79

Hill, C. (1954) Some Aspects of Industrial Location, "Jo. of Industrial Economics", 2, 184-92

Hoare, A.G. (1971) "International Airports and Economic Geography: A Study of the Impact of London Airport." Unpublished Ph.D. Dissertation, University of Cambridge

- " - (1975) Linkage Flows, Locational Evaluation and Industrial Geography: A Case Study of Greater London, "Environment and Planning", A, 7, 1, 41-58

Hollingsworth, T.H. (1970) "Migration: A Study Based on Scottish Experience between 1939 and 1964." Occ. Paper No. 12, Dept. of Social and Economic Research, University of Glasgow and Oliver and Boyd, Edinburgh

Hood, N. and Young, S. (1976) US Investment in Scotland - Aspects of the Branch Factory Syndrome, "Scottish Jo. of Political Economy", 23, 3, 279-94

Howard, R.S. (1968) "Movement of Manufacturing Industry in the United Kingdom, 1945-1965." Board of Trade and Department of Industry, HMSO, London

Hudson Report (1974) see Stillman, E. et al, op. cit.

Hughes, J.T. (1979) An Urban Approach to Regional Problems, Chapter 8, 173-89 in MacLennan, D. and Parr, J.B. (eds.)op.cit.

Ingham, G.E. (1970) "Size of Industrial Organization and Worker Behaviour." Cambridge University Press, Cambridge

Institute of Personnel Management (1980) "Executive Redundancy." IPM, London

Johnson, J.H. et al (1974) "Housing and the Migration of Labour." Saxon House, Farnborough

Johnson, P.S. and Cathcart, D.G. (1979) The Founders of New Manufacturing Firms: A Note on the Size of Their 'Incubator' Plants, "Jo. of Industrial Economics", 28, 2, 219-24

Johnston, R.J. (1978) "Multivariate Statistical Analysis in Geography." Longman, London

Johnston, T.L. et al (1971) "Structure and Growth of the Scottish Economy." Collins, Glasgow and London

JURUE (1980) "Industrial Renewal in the Inner City: An Assessment of Potential and Problems." Department of the Environment, London

de Kadt, E. and Williams, G. (eds. 1974) "Sociology and Development." Tavistock, London

Kaplan, A.D.H. (1948) "Small Business - Its Place and Problems." McGraw-Hill, New York

Keeble, D.E. (1968) Industrial Decentralization and the Metropolis: The North West London Case, "Transactions and Papers, Institute of British Geographers", 44, 1-54

- " - (1972a) The South East and East Anglia. I. The Metropolitan Region, Chapter 2, 71-105 in Manners, G. (ed.) op. cit.

- " - (1972b) The South East and East Anglia. II. The Zonal Structure, Chapter 3, 107-52 in Manners, G. (ed.)op.cit.

- " - (1976) "Industrial Location and Planning in the UK." Methuen, London

- " - (1978) Industrial Geography, "Progress in Human Geography", 2, 2, 318 - 23

Keeble, D.E. and Hauser, D.P. (1971) Spatial Analysis of Manufacturing Growth in Outer South East England, 1960-1967. I. Hypotheses and Variables, "Regional Studies", 5, 229 - 62

- " - (1972) Spatial Analysis of Manufacturing Growth in Outer South East England, 1960-1967. II. Methods and Results, "Regional Studies", 6, 1, 11-36

Kempthorne, O. et al (eds. 1954) "Statistics and Mathematics in Biology." Hafner, New York

Kerr, D.P. and Spelt, J. (1957) Manufacturing in Downtown Toronto, "Geographical Bulletin", 10, 1, 5-20

- " - (1958) Manufacturing in Suburban Toronto, "Canadian Geographer", 12, 1, 11-9

Kerr, C. (1964) The Balkanization of Labor Markets in Bakke, E. W. (ed.) op. cit.

Kim, J. and Kohout, F.J. (1975) Multiple Regression Analysis: Subprogram Regression, Chapter 20, 320-67 in Nie, N.H. et al op. cit.

King, P.E. (1975) Mobility of Manufacturing and the Interstate Redistribution of Employment, "Professional Geographer", 27, 441-8

Koestler, A. (1959) "The Sleepwalkers. A History of Man's Changing Vision of the Universe." Penguin, Harmondsworth, Middlesex

Kruijt, E. (1979) The Changing Spatial Pattern of Firms in Amsterdam: Empirical Evidence, "Tijdschrift voor Econ, en Soc. Geografie", 70, 3, 144-56

Kuhn, T.S. (1970) "The Structure of Scientific Revolutions." University of Chicago, Chicago 2nd edition

Laidlaw, J. (1977) personal communication

Lea, K.J. (1977) "A Geography of Scotland." David and Charles, Newton Abbot

Leibenstein, H. (1978) "General X-Efficiency Theory and Economic Development." Oxford University Press, New York

Leone, R.A. and Struyk, R. (1976) The Incubator Hypothesis: Evidence from Five SMSAs, "Urban Studies", 13, 3, 325-32

Lever, W.F. (1978) Company-Dominated Labour Markets: The British Case, "Tijdschrift voor Econ. en Soc. Geografie", 69,5, 306-12

Liggins, D. (1977) The Changing Role of the West Midlands Region in the National Economy in Joyce, F. (ed.) "Metropolitan Development and Change. The West Midlands: A Policy Review." University of Aston for the British Association, Birmingham

Lloyd, P.E. and Dicken, P. (1968) The Data Bank in Regional Studies of Industry, "Town Planning Review", 38, 4, 304-16

Lloyd, P.E. and Mason, C.M. (1978) Manufacturing Industry in the Inner City: A Case Study of Greater Manchester, "Transactions and Papers, Institute of British Geographers", New Series, 3, 1, 66-90

Lonsdale, R.E. and Seyler, H.L. (eds. 1979) "Nonmetropolitan Industrialization." V.H. Winston and Sons, Washington

Loveridge, R. and Mok, A. (1978) "Theories of Labour Market Segmentation." EEC, Brussels

McCrone, G. (1965) "Scotland's Economic Progress 1951-1960: A Study in Regional Accounting." Social and Economic Studies, New Series No. 4, University of Glasgow and George Allen and Unwin, London

McDermott, P.J. (1977) "Regional Variations in Enterprise: Electronics Firms in Scotland, London and the Outer Metropolitan Area." Unpublished Ph.D. Dissertation, University of Cambridge

Mackay, D.I. (ed. 1977) "Scotland 1980. The Economics of Self Government." Q Press, Edinburgh

Mackay, R.R. (1973) "The Impact of R.E.P.." Occ. Paper No. 9, Dept. of Economics, University of Newcastle upon Tyne

- " - (1974) Evaluating the Effects of British Regional Economic Policy - A Comment, "Economic Jo.", 84, 2, 367-72

- " - (1978) "The Death of Regional Policy - or Resurrection Squared ?" Disc. Paper No. 10, CURDS, University of Newcastle upon Tyne

MacLennan, D. and Parr, J.B. (1979) Introduction, xv - xviii in MacLennan, D. and Parr, J.B. (eds.) op. cit.

- " - (eds. 1979) "Regional Policy - Past Experience and New Directions." Martin Robertson, London

McVean, P. (1979a) "A Study of Major Redundancies." Redundancy and Displacement Research Paper No. 2, PEIDA, Edinburgh

- " - (1979b) "The Effect of Redundancies on Unemployment: Data Base of Empirical Analysis." Redundancy and Displacement Research Paper No. 3, PEIDA, Edinburgh

Machlup, F. (1967) Theories of the Firm: Marginalist, Behavioural and Managerial, "American Economic Review", 57, 1, 1 - 33

Manners, G. (ed. 1972) "Regional Development in Britain." Wiley, London

Marquand, J. (1980) "Measuring the Effects and Costs of Regional Incentives." GES Working Paper No. 32, Dept. of Industry, London

Massey, D.B. (1975) Approaches to Industrial Location Theory: A Positive Spatial Framework, 84-108 in Cripps, E.L. (ed.) "Regional Science - New Concepts and Old Problems." London Papers in Regional Science No. 5, Pion, London.

Massey, D.B. (1976) Is the Behavioural Approach Really an Alternative ? 80-6 in Massey, D.B. and Morrison, W.I. (eds.) op. cit.

- " - (1977) "Industrial Location Theory Reconsidered." Open University D204 Section III, Unit 25

- " - (1978) "In What Sense a Regional Problem ?" Paper presented to the RSA Conference, The Death of Regional Policy, Glasgow.

- " - (1980) "Industrial Location in Context: A Proposal." Paper presented to the IBG Study Group on Industrial Activity and Area Development, London.

Massey, D.B. and Morrison, W.I. (eds. 1976) "Industrial Location: Alternative Frameworks." CES-CP15 Proceedings of a Workshop. Centre for Environmental Studies, London

Massey, D.B. and Meegan, R.A. (1977) "Industrial Restructuring Versus the Cities." CES-WN-473 Centre for Environmental Studies, London

Medawar, P.B. (1969) "Induction and Intuition in Scientific Thought." Methuen, London

Moar, L. et al (1981) "Job Generation in Scottish Manufacturing Industry." Fraser of Allander Institute, Glasgow

Moore, B. and Rhodes, J. (1973) Evaluating the Effects of British Regional Policy, "Economic Jo.", 83, 87-110

- " - (1974) Regional Policy and the Scottish Economy, "Scottish Jo. of Political Economy", 21, 3, 215-35

- " - (1976) Regional Economic Policy and the Movement of Manufacturing Firms to Development Areas, "Economica", 43, 1, 17-31

Moore, B. et al (1977) The Impact of Regional Policy in the 1970s, "CES Review", 1, 67-77

Moses, L. and Williamson, H.F. (1967) The Location of Economic Activity in Cities, "American Economic Review", 57, 2, 211-22

Nason, R. (1963) Venture Capital: Money in a Hurry, "Dun's Review and Modern Industry", 82, 5, 34-5 and 88-9

Nelson, R.R. et al (1967) "Technology, Economic Growth, and Public Policy." Brookings Institution, Washington

Nie, N.H. et al (1975) "SPSS Statistical Packages for the Social Science." McGraw-Hill, New York 2nd edition

Norcliffe, G.B. (1970) "Industrial Location Dynamics: A Positive Theory, Measurement, and a Case Study of Changing Patterns of Manufacturing Plant Location." Unpublished Ph.D. Dissertation, University of Bristol

Norcliffe, G.B. (1977) "Inferential Statistics for Geographers. An Introduction." Hutchinson, London

Northern Region Strategy Team (1975) "Movement of Manufacturing Industry: The Northern Region 1961-1973." Technical Report No. 10, NRST, Newcastle upon Tyne

Nunn, S. (1980) "The Opening and Closure of Manufacturing Units in the UK 1966-75." GES Working Paper No. 36, Dept. of Industry, London

Openshaw, S. (1976) An Empirical Study of Some Spatial Interaction Models, "Environment and Planning", A, 8, 1, 23-41

- " - (1977) A Geographical Solution to Scale and Aggregation Problems in Region-Building, Partitioning and Spatial Modelling, "Transactions and Papers, Institute of British Geographers", New Series, 2, 4, 459-72

Pollard, S. 1975) Review of Slaven, A. (1975) op. cit. in "Regional Studies", 9, 4, 427

Pratten, C.F. (1971) "Economics of Scale in Manufacturing Industry." Cambridge University Press, Cambridge

Rees, J. (1979) Technological Change and Regional Shifts in American Manufacturing, "Professional Geographer", 31, 1, 45-54

Rich, D.C. (1975) "Accessibility and Economic Activity: A Study of Locational Disadvantage in Scotland." Unpublished Ph.D. Dissertation, University of Cambridge

Ridgman, W.J. (1975) "Experimentation in Biology. An Introduction to Design and Analysis." Blackie, Glasgow and London

Robertson, G. (1978) "Housing Tenure and Labour Mobility: Summary and Main Findings." Paper presented to the RSA Conference, Housing Tenure and Labour Mobility, Edinburgh

Sawicki, D.S. (1973) Studies of Aggregated Areal Data: Problems of Statistical Inference, "Land Economics", 49, 109-14

Scottish Council (Development and Industry)(1968) "Investment in Scotland." Edinburgh

- " - (1977) "Investment Survey-Ownership Analysis." Unpublished summary report, Edinburgh

Scottish Development Agency (1979) "The Electronics Industry in Scotland. A Proposed Strategy." Report prepared by Booz, Allen and Hamilton for SDA. Glasgow

Scottish Development Department (1977) "Manufacturing Industry in the Four Scottish Cities, 1966-71." Edinburgh

Scottish Development Department (1978) "Scottish Economic Monograph." Planning Advice Note 23

Scottish Economic Bulletin (1977) Relative Performance of Incoming and Non-incoming Industry in Scotland, "Scottish Economic Bulletin", Autumn, 13, 14-25

Segal, N.S. (1979) The Limits and Means of 'Self-Reliant' Regional Economic Growth, Chapter 10, 211-24 in MacLennan, D. and Parr, J.B. (eds.) op. cit.

Shaw, R.W. and Sutton, C.J. (1976) "Industry and Competition. Industrial Case Studies." MacMillan, London

Silbertson, A. (1972) Economics of Scale in Theory and Practice, "Economic Jo.", Supplement, 82, 325s, 369-91

Sjoberg, G. (1955) The Comparative Method in the Social Sciences, "Philosophy of Science", 22, 106-17

Slater, D. (1975) The Poverty of Modern Geographical Enquiry, "Pacific Viewpoint",16, 2, 159-76

Slaven, A. (1975) "The Development of the West of Scotland, 1750 -1960." Routledge and Kegan Paul, London

Smart, M.W. (1974) Labour Market Areas: Uses and Definition, "Progress in Planning", 2, 4, 239-353

Smelser, N.J. (1968) The Methodology of Comparative Analysis of Economic Activity, Chapter 3, 62-75 in Smelser, N.J. (ed.) op. cit.

- " - (ed. 1968) "Essays in Sociological Explanation." Prentice-Hall, Engelwood Cliffs, N.J.

Smith, I.J. (1978) "Ownership Status and Employment Changes in Northern Region Manufacturing Industry, 1963-1973." Disc. Paper No. 7, CURDS, University of Newcastle upon Tyne

South East of Scotland Development Authority (SESDA)(1973) "The Advantages of Obtaining Development Status for the Whole SESDA Region." SESDA 73 RS, Edinburgh

Spooner, D.J. (1972) Industrial Movement and the Rural Periphery: The Case of Devon and Cornwall, "Regional Studies", 6,2, 197-215

Stillman, E. et al (1974) "The United Kingdom in 1980: The Hudson Report." Hudson Institute Europe, Associated Business Programmes, London

Storey, D.J. (1981) New Firm Formation, Employment Change and the Small Firm: The Case of Cleveland County, "Urban Studies", 18, 335 - 345

Storey, D.J. and Robinson, J.F.F. (1979) "Entrepreneurship and New Firm Formation: The Case of Cleveland County." Paper presented at the CES Workshop, New Firms in Local and Regional Economies, Centre for Environmental Studies, London

Summers, G.F. et al (1979) Coping with Industrialisation, Chapter 11, 161-78, in Lonsdale, R.E. and Seyler, H.L. (eds.) op. cit.

Swales, J.K. (1979) Entrepreneurship and Regional Development: Implications for Regional Policy, Chapter 11, 225-241 in MacLennan, D. and Parr, J.B. (eds.) op. cit.

Taylor, K.T. (1970) Review of Frank, A.G. (1969) op. cit. in "Science and Society", 34, 1, 104-6

Thomas, B.M. (1979) "Employment Strategies: Recruitment as a Social Process." SSRC Final Report HR-3526

Thwaites, A.T. (1978) Technological Change, Mobile Plants and Regional Development, "Regional Studies", 12, 4, 445-61

Townsend, A.R. (1981) Geographical Perspectives on Major Job Losses in the UK, 1977-80, "Area", 13, 1

Townsend, A.R. et al (1978) Employees' Experience of New Factories in North East England: Survey Evidence on Some Implications of British Regional Policy, "Environment and Planning", A, 10, 12, 1345-62

Turnock, D. (1979) "The New Scotland." David and Charles, Newton Abbot

Vallier, I. (1971) Empirical Comparisons of Social Structure: Leads and Lags, 203-63 in Vallier, I. (ed.) op. cit.

Vallier, I. (ed. 1971) "Comparative Methods in Sociology. Essays on Trends and Applications." University of California Press, Berkeley

Welch, R.V. (1970) Immigrant Manufacturing Industry Established in Scotland between 1945 and 1968: Some Structural and Locational Characteristics, "Scottish Geographical Magazine", 86, 2, 134-48

Williamson, J.G. (1965) Regional Equality and the Process of National Development, A Description of the Patterns, "Economic Development and Cultural Change", 13, 1, 3-45

Wood, P.A. (1973) "Economic Planning and the West Midlands." Occ. Paper No. 15, Dept. of Geography, UCL, London

- " - (1974) Urban Manufacturing: A View from the Fringe, Chapter 7, 129-54 in Johnson, J.H. (ed.)"Suburban Growth." Wiley, London

Wood, P.A. (1976) "Industrial Britain. The West Midlands." David and Charles, Newton Abbot

- " - (1978) "Priorities in Industrial Location Research." A report to the Human Geography Committee of the SSRC, London

Woodward, N.W.C. (1978) "The Employment Characteristics of Establishments in Industrial South Wales." Working Paper, Dept. of Economics, University of Cardiff

Wynn, H.P. (1978) Freedom of Statistical Information, "Jo. of the Royal Statistical Society", A, 141, 1, 1 -13

Addendum:

Cameron, G.C. (1977) Constraining the Growth of Primate Cities: A Study of Methods, Chapter 4, 129 - 161 in Bendixson, T. (ed.) "The Management of Urban Growth." Environment Directorate, OECD.